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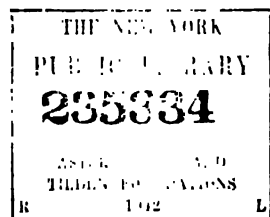
STONE.

An Illustrated Magazine.

VOLUME VI.

DECEMBER. 1892. TO MAY, 1893.

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STONE.

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B—Stone.



STONE

VOLUME VI.

DECEMBER, 1892.

NUMBER I.

DECORATION OF BUILDINGS.



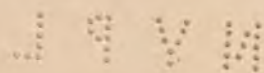
THE sheet of details shown in frontispiece were designed by French artists for decorative features of monumental work: *i. e.*, head-stones, tablets, tombs and other structures of like character. However, there are among them various features which are suitable for general decorative purposes and in connection with them it may be said that the details of this character put the stamp of refinement and of artistic adjustment to any structure of which they may be a part. The general outline may not be good but the detail, if carried out by the hands of an artist, shows that far the stamp of an artist and to a large extent gives general character to the entire design. It is of course true that in order to have a universal success, the outline and the detail should be carried out in the same artistic spirit. However, it is lamentably true that with the buildings and other structures in this country there are more of them that are ruined from the standpoint of the artist, through bad detail, than by the outline of the structure. A great many architects and others make designs which are not so bad as to outline; the churches, school houses and other buildings are often formed so as to be very pleasing in the mass, but the details with which they are decorated, the forms of the mouldings and the ornamental parts, are clumsy and crude to an extent that precludes such buildings as to being considered artistic.

The large business structures of Chicago fail for the most part, because the designs are weak in detail; because the decorative parts are badly de-

signed. In a recent number of the *Engineering Magazine*, the editor was greatly disturbed on account of what had been said by an eastern publication as to the character of the Chicago structures. He said: "When will the critics of the East come to realize the true merits of the Chicago buildings?" This referred of course to the commercial architecture. There is no one but will allow the real and proper merit which belongs to these structures. They are great engineering feats. The character of the structures which has been developed by the Chicago architects has been very wonderful indeed. They have built very tall buildings on a very bad soil and built them well. Considering the character of their work the results have been secured at a relatively low cost. But when viewed from an artistic standpoint nearly all are failures, and they are failures not through lack of proper outline or form in the mass, but on account of the character in the detail. It is nearly always bad. The Rookery building of Chicago, was one of the first of the great office buildings. It is one of the best though not the best from an artistic standpoint. Certain parts of the detail are interesting, but taking it as a whole the structure is without unity; it is a hodge-podge of architectural composition, and as said before, the result from an artistic standpoint is not satisfactory. This structure will not be rated high in the architectural history of this country. The great merit of most of these buildings are as feats of engineering, and not as architectural composition. This thought does not appear to have occurred to the critics. Buildings are viewed, their largeness is apparent, the difficulties of the undertaking are understood, and the progress and spirit of Chicago is taken into consideration in attaching value to the products of their architects. There are very few notable exceptions to the fact that Chicago's great buildings are not successful architecturally.

The general composition of these buildings is good. The piers start at the bottom and continue through to the top. The windows naturally come in in good proportions and all that is needed to develop high-class structures as architectural productions, is that the work of the architect be carried forward in the same serious thoughtful spirit that has characterized the work of the engineer. We cannot take these buildings and design them so as to say they are in the Romanesque style or the Renaissance or anything of the kind. However, we can take the natural form which belongs to them as commercial structures, as stores and office buildings, and decorate them with the detail which has belonged to any period. If we take these natural forms and decorate them well, putting them into the hands of artists, specialists along that line, giving work the thought which belongs to it and the artistic help, American architecture of high character will be the result.

After all, architecture is decorated construction. We may have good construction and not have it properly decorated, and yet fail of securing good



architecture. That is the trouble with a very large proportion of the large office buildings of Chicago. From an engineering point they stand high. The best judgment which may be given of them is as engineering structures. All that is necessary to develop this work into a high grade of architecture, is that the engineering work be properly decorated. This makes it art. The structures have their form which is suggested by their commercial requirements. The form is individual and natural and with the decorative work which is suited to the proper clothing of the structural parts, we will find that we have a successful architecture suited to our own time, our own country, and our own requirements. We will have something national. There are no office buildings in the world to compare with those which we have. They have taken different form; the structural requirements have been naturally carried out and now it is that all we have to do is to look to the clothing, the decoration, of the engineering work. In the past, failures have been made through an idea that decoration was a mere disturbance of the surfaces. There is a series of great arches in one place, openings of one form in another, different forms, different proportions in other locations, and these and the plain surfaces are decorated in a way which has in mind merely variety or the unusual, but not that which is essentially harmonious and beautiful, and which has its proper relation to the structure as a whole, and the parts in detail. It may be asked: "Should decorative forms have a character of their own; should they, because they are in office buildings, be different than if they were on some other structure?" Not necessarily so. We may take an office building and after the outlines, piers, and the natural position of the lintels have been determined and the sizes of the spaces between the windows and the doors been arranged, we may take these piers, panels and lintels, and decorate them with forms which are artistic and which are pleasing to the eye. In speaking of the decoration of these parts it does not mean that they are to be covered with ornamental work. It means that they are to be given form in keeping with their use, and that such ornament or variation in form be given as is natural and proper for the position which these parts occupy in the composition. The piers at the base of the building are naturally heavier than above. The character of the material which surrounds it must naturally have a stronger, more vigorous quality than that which comes in the upper and lighter parts of the building. Hence there may be plain surfaces in contrast with small decorated surfaces for the lower part of the structure and with the decoration of a quality that is in keeping with the character and general solidity of the position that it occupies. As we go up or into other parts of the structure, there is a natural, proper variation according to the position which it occupies. Decoration, or decorative forms which are suited to the heavy lower, more massive parts of the building, are naturally at a place where the physical strain upon the

structure is not so great. This principle is carried out in some of the later Italian-Gothic architecture. Buildings would start out very plain and heavy at the bottom, continue to the top with occasional suggestions of decoration, and at the top they would fairly blossom with beauty and ornamental forms. In some of their towers this was carried to extremes. The work would be exceedingly vigorous at the bottom, going up with only a suggestion of decoration, and at the top, the crowning point of the tower, the work would be exceedingly brilliant. This is mentioned as an illustration and not as something which is suggestive of the proper formula to be used in the design of an office structure.

It is not so much a question as to the exact character of decoration, whether it be Romanesque, Gothic, Renaissance, or what not. The building may be a highly successful architectural production through the use of the decorative forms belonging to any of these styles, but the structures themselves cannot carry out the character of the Romanesque architecture or the Renaissance or the Gothic, as it existed at the time of its birth. All that we can use of the styles named, or any of the earlier styles, is the decorative forms and not the substance of their composition. We may study these styles as to their composition but we cannot expect to use them with exactness. We may study the detail and if the work is done rationally, we are able to supply it. In doing this it is not expected that we can take a window from a cathedral, as in the case of the Gothic architecture, or a doorway of the Renaissance, and put it into a business structure. However, we may make a doorway or a window in an office building and be studying the decoration of one style or another, adopt that decoration, and give its proper relation to its new use. This is architecture. We have the frame work; we have the general structure, worked out. All that we need to develop a successful architecture is the proper and intelligent decoration of these structures. So far, this work has rarely been done.

Louis H. Gibson.



REMARKS ON PREVALENT METHODS OF TESTING BUILDING STONES.

IN Vol. VII of the Minutes of Proceedings of the Institution of Civil Engineers (London) 1892, there is a report by Mr. Thomas Hudson Beare on "Building Stones of Great Britain; Their Crushing Strength and Other Properties," which has already been the subject of a brief note in the pages of this magazine, (July 1892: p. 223.) My purpose in referring to the matter again is to call attention to what appears to me to be a waste of energy due either to ignorance or an intentional ignoring of what has previously been done in this line, or to a lack of proper consideration of what was to be gained by such tests.

It may be true, as the author states, that very few systematic tests of the various properties of British building stones have been published since the report of the royal commission of 1883 was issued. But, the question arises, is it worth the while to make further tests, and if so what should be their character? I have elsewhere* stated my views regarding the common methods of testing and it is unnecessary to repeat them in full here, other than to observe that the experimenter has, in my opinion, devoted a very large proportion of his energies to tests in no way essential and from which nothing of value is to be learned, and has devoted little, if any, time to those points which I am firmly convinced need most to be experimented upon. To the average architect and engineer strength, and perhaps elasticity of the materials, seem of paramount importance, and test after test is made to ascertain the actual crushing strength of carefully prepared cubes of material already known to possess an endurance far beyond any probable demand.

"There is scarcely a stone in the market that would not be found, when freshly quarried, strong enough for all ordinary purposes of construction. The problem, in my estimation, is not what will a selected and carefully prepared sample of stone bear to-day, but what will it bear after many seasons of exposure to heat and frost." (Stones for Building and Decoration, p. 385.) This extract is not given as an arbitrary opinion, but is a conclusion reached by careful study and observation, and by a detailed perusal of the literature on the subject. Yet Mr. Beare not merely devotes the largest share of his energies to the same old round of tests, but even repeats with the same results the experiments of Gilmore with reference to the efficacy

*Stones for Building and Decoration, Wiley & Sons, New York. Also *American Architect*, Feb. 16, 1889.

of wood, lead, and plaster bearings, which were made and published seventeen years ago[†] but to which there is no reference.

Singularly enough the most suggestive results obtained by the entire series of Mr. Beare's experiments were wholly disregarded. Obviously since a stone in a bridge abutment, foundation or house wall is liable at any or all times to be saturated with water or repeatedly saturated and dried, tests, if necessary at all, should be made while the stone is under these conditions. Yet but two tests of this kind were made and these accidentally, the stones having first been tested for their absorptive qualities. And as it was "found that there was apparently some reduction of strength caused by the immersion in water and subsequent drying," this plan was abandoned. It is difficult to understand how, if the purpose of the experimenters was actually to learn the properties, good and bad together, such a promising "lead" should have been overlooked. We know already, or can tell from a simple inspection, whether or not a prepared sample of stone is strong enough for practical purposes. But we do not know, and cannot always tell from mere inspection, how such a stone is going to stand the weather, is going to endure the constant contraction and expansion of ordinary temperatures, the more energetic influences of artificial heat, of freezing water, or even the weakening influence of absorbed moisture.

I have yet to learn of a single instance in which a stone in a wall has crushed through its own inherent weakness. It may have become disintegrated by frost, discolored by oxidation, or possibly cracked through the unequal settling of the structure. But against such mishaps, all the pressure tests of a dozen generations will not protect us. It is true that in the series under discussion other tests were made, but they were not carried to their critical points. A few tests only were made to learn the power of a stone to resist the action of frost. It had been intended to make a complete series, but owing to a change from freezing to milder weather such were abandoned. It seems strange and is greatly to be regretted that in these days of artificial freezing mixtures, one of the most important, if not the most important test that can be made, should have been thus dropped, owing merely to a change in the weather. But I have already gone beyond my limits. It must be understood that what has been said is not against Mr. Beare, personally. It is, rather, intended as a protest against longer trifling with useless methods, when the same amount of time and energy, properly directed, might be productive of valuable results.

At the risk of being considered egotistical I reproduce here what is said on this subject in my work above referred to. The time that has elapsed

[†] See Gilmore's report on the compressive strength, etc., of building stone. Annual report Chief of Engineers, 1875. Also notes on the compressive resistance of freestone, brick piers, etc., Wiley & Sons, New York, 1888.

since it was written, and the experience therein gained, has only served to confirm me in the views there expressed :

"Assume first that the stone is designed for use in the exterior walls of a building, subjected to all the vicissitudes of our northern climate, and to only such conditions of pressure and strain as may exist in any large buildings. All things considered, it seems best that the tests be made on two-inch cubes. These should be prepared by sawing and grinding, never with hammer and chisel. After drying at a temperature not exceeding that of boiling water, the ratio of absorption should be determined by complete immersion for a period of not less than twenty-four hours. The cube should then be repeatedly frozen and thawed while in this saturated condition, and the amount of disintegration ascertained by careful weighings. If the stone is a fragmental one (sandstone,) and it is found to suffer appreciable disintegration by freezing, it may be well to ascertain the loss in strength also. This can be done by crushing these same cubes after the freezing tests, and also freshly prepared cubes of the same material not otherwise tested. The freezing can be brought about by means of such apparatus as is used in the manufacture of artificial ice, or as Chauvenet has done, by placing the saturated cubes in the center of a large box which is then placed in a mixture of pounded ice and salt."†

"The question of durability of color and resistance to atmospheric action, can, in the laboratory, be settled only by chemical and microscopic tests. The condition of the iron, whether in the form of sulphide or protoxide carbonates is the main question to be considered. A little may perhaps be learned by submitting the stone to the action of artificial atmospheres, samples being suspended for a period of several weeks under bell-glasses charged with acid fumes. The resistance to the action of carbonic acid, can perhaps be best determined as Prof. Winchell has done** by placing the samples in a basin of water through which carbonic acid gas is kept constantly bubbling. This test is scarcely necessary, except upon calcareous rocks or fragmental rocks with calcareous or ferruginous cements. The determination of the modulus of elasticity as made by processes now in vogue, is apparently sufficiently accurate. When, as sometimes happens, it is desirous to ascertain the relative powers of resistance to wear, as in pavements, or from wind-blown sand, this can be readily done by means of a carefully regulated sand-blast, such as is used in the Tilghman process of stone-carving. This property might almost equally well be learned by observing the manner in which the stone works under the chisel. Pressure tests when necessary at all, may be made on the two-inch cubes prepared as

† Second biennial report of Board of Capitol Managers to the General Assembly of Colorado. 1886.

** Geology of Minnesota. Final report, Vol. I.

above, and crushed between steel plates, as in any of the leading testing machines."

After all that has been said and written, there are no tests or series of tests equal to an examination of the stone in its natural out-crops, or in structures of long standing. However careful, elaborate and apparently exhaustive may be a series of tests in the laboratory, they should always be supplemented, when possible, by such field examinations. Indeed, if the writer were called upon to-day to decide a question of this kind upon any but the purely calcareous rocks, and was restricted to either field examination or laboratory tests, he unhesitatingly declares that, with good natural out-crops, or quarry openings of long standing, he would choose the field examination, no matter how elaborate the other tests might be.

A very essential item in this connection, is that all the tests be made under the direct supervision of one thoroughly acquainted with the mineral and chemical character of the rocks, their structure, origin, mode of occurrence and characteristic manner of weathering. A purely theoretical knowledge is worse than valueless, and only one who has devoted much time to the work, both in the laboratory and in the field, can hope to deal with the matter successfully. One great difficulty with all such work, is that we are prone to expect too much, to obtain immediately results which, in the ordinary course of events, can be brought about only by months and perhaps years of careful observation, experiment and study.

George P. Merrill.

A COMPLIMENTARY CORRECTION.

The following letter from the superintendent of the Bayport, Mich., quarries explains itself, and needs no further introduction.

Editor STONE :

DEAR SIR—As per my postal of yesterday, please send me "STONE" during the year 1893. I suppose, in writing up any industry, you try to come as near the truth as possible. I would like to refer you to your article beginning on page 647, "Whetstones of the United States."

On page 649 of your November number, you say the "sandstone" scythe stone of Ohio and Michigan is controlled by a single company—the Cleveland Stone Co. This is not so. They have competition in the grindstone and scythe business in the person of the Union Grindstone Co., of Port Austin, Union county, Mich., whose quarries are at Grindstone City, in the same deposit as the Cleveland Stone Co.'s quarries, and whose works are on nearly as extensive a scale as the Cleveland Stone Co.'s in Michigan.

Grindstone City is only thirty-six miles from here, and was at one time my home. I noticed the mistake, and take the liberty to call your attention to it.

I took STONE the first two years it came out; have intended to renew my subscription but neglected it. I notice the improvement since then, and congratulate you on the excellence of your journal throughout.

Yours respectfully,

W. H. Wallace.

Bay Port, Mich., Dec. 5, 1892.

NEW ENGLAND NEWS AND NOTES.

OCTOBER 31st the workmen on the Brainard quarry at Portland, Conn., were notified that they would be put on winter pay and nine hours, fourteen cents, November 1st. The men determined not to do it and quit work entirely. The company then decided to cease work for the winter, as they have something like 60,000 feet of stone in the yard awaiting orders. The workmen are now trying to decide whether fourteen cents an hour or nothing is the better basis on which to live.

Quincy, Mass., granite men, not satisfied with the advertising they got in the Bunker Hill monument, Lincoln's monument at Springfield, Ill., and others almost as noticeable, not to mention the many magnificent buildings set to their credit, have decided upon a comprehensive exhibit at the world's fair. They have asked for and received the first allotment of space in the Massachusetts building, and will place an exhibit valued at \$10,000 therein. They offer prizes for designs and solicit any new and original ideas.

The stock for the Black Hill Granite Company, of Haverhill, N. H., is all subscribed and the opening of spring will see operations on a large scale. The activity in that business is increasing about Haverhill and bids fair to develop into a great industry in time.

The Monson Hillside Slate Company has been organized at Portland, Me., to deal in and manufacture slate and other mineral products. The capital stock is \$50,000. The officers are: President, Alfred H. Davenport, Boston; treasurer, Benjamin G. Ward, Portland.

The Burpee Granite Company are busily at work on the foundation of their new building at Calais, Me. As soon as it is ready for occupancy the company's works will be removed from St. John, N. B.

N. F. Curran is getting out an excellent building granite at Eagle Lake, Me. He can easily take out blocks twenty feet long and five feet square.

Quincy, Mass., and Rockport, Me., are shipping great quantities of paving blocks to Lynn, Mass. The city is changing from dirt and gravel roads to granite paving as fast as possible.

Father Cuddihy, of St. Mary's church, at Milford, Mass., preached a sermon and offered his mediatory services in the existing granite troubles not long ago. His remarks were attentively listened to and a conference followed, but the outcome has not yet been made public.

The Shaler & Hall quarry at Portland, Conn., has been closed for the winter. The men on the other stone work have been put on winter time

and pay. The past season has been most successful, a full force of men having been employed on full time.

The Swedes who have been at work in Brainard's quarry at Portland, Conn., have gone home to Sweden for the winter, but will return in the spring if work warrants.

Leading manufacturers say that the granite troubles benefited rather than injured Williamstown, Vt., and now business is more prosperous than ever before.

At Barre, Vt., there is some anxiety expressed among manufacturers regarding the scarcity of rough stock for winter. The quarries were not actively operated during the strike, and the fact that a large proportion of the stone used in local sheds is quarried to order, gives color to the assertion. The accumulation of work during the idle period was so great that much activity results in the sheds at the beginning of winter. This exceptional demand for stone, coupled with idleness during the summer, create a scarcity of the darker grades particularly. The lack need not cause any alarm, however, for some of the quarries will be worked all winter.

Milne & Wylie, of Barre, have added an engine and hoisting machine to their quarry equipment, guaranteed by its builders to lift twenty tons without difficulty.

The Hallowell Granite Works have made a great improvement in and about their quarry at Granite Hill, Me., since they resumed work after the strike. The company has 225 men at work now, of whom 125 are cutters.

H. A. Duffy has put in new steam drills, a new boiler and has built a new engine-house at his quarry in Barre, ready for work in the spring.

About 7,000 tons of granite was hauled over the Barre railroad in October, the largest month's business since the road was built.

The business of the Vermont Agalite Pulverizing Company, of Rutland, Vt., has exceeded the expectations of the promoters. The quarries and works are at Waterville.

The first slate quarry ever opened in Maine was at Brownville on the farm of Phineas Morrill, an uncle of Senator Lot M. Morrill, many years ago, and the original quarries are still being operated.

The Hallowell, Me. Central Granite Works, operated by Joseph Archie, have been attacked by operatives for non-payment of wages. The last payment was twenty cents on the dollar. All work has been suspended,

The Flynt granite quarries, of Monson, Mass., are still favored with plenty of business. The company have recently taken some large contracts for buildings and bridge work.

The Union Granite Company, of Hardwick, Vt., are making considerable improvements in their operating appliances. The railroads have recently given an ocular demonstration of short-sightedness in refusing to put in

sidings for the accommodation of the cutting sheds of the Union company, Bashaw Brothers and Davis.

William Booth, of New York, president of the Booth Bros. and Hurricane Island Granite Company and W. S. White, manager of the same company in the state of Maine, also one of the directors of the Jonesport Red Granite Company, with John L. Dalot, also a director, were in Jonesport, Me., recently and visited the quarry and other property owned by the company. At a meeting of the directors the same evening they expressed great satisfaction with the progress that had been made in developing the quarry and pronounced it one of the best equipped quarries and capable of doing the largest business of any they had visited for one that had been established such a short time. The stone is pronounced by experts one of the best in the state. The company have built a stone wharf 100 feet long and have nineteen feet of water there at an ordinary tide, and a soft muddy bottom. The three-masted schooner, Charley Buck, has loaded with a cargo of dimension and random stone and sailed for Staten Island. The Lanie Cobb is to sail for the quarry first chance to load with a cargo of the same kind of stone that will complete the contract on Staten Island. The company have also a contract for all the stone they can quarry this season, at good prices, to be shipped to Hurricane Island. The company have purchased 160 acres of the best quarry property in the state, on Head Harbor Island.

The Portland, Conn., brownstone quarries began work December 1, on half time, and will continue until spring, if the demand for stone will warrant it. In order to give the men an equal opportunity they alternate; that is, one-half the usual force works one week and the other half the next. The arrangement meets with general favor among the men. The volume of business during the winter months will depend largely on the condition of the river. If the transportation of stone is not interfered with by ice, it is probable that several barge-loads will be shipped during December; otherwise the shipments will be necessarily slow.

The C. H. Hunton Granite Company, of Barre, are working about fifty men and report that contracts now on hand will keep them busy until spring. The Empire Granite Company, of the same place, have eighty-five men at work and say business is brisk.

One of the red granite dealers near Calais, Me., talks of exporting to Europe. To substantiate this opinion he says that red granite in the rough in the Scotch and English markets brings a higher price than in America. The smaller dimensions are worth five shillings or a dollar and a quarter per cubic foot, and increasing in value as dimensions increase, to as high as three dollars per cubic foot for a stone of a size which sells in America at one dollar and a half per foot. The reason of this is they can get

larger sizes of stone in our American quarries than can be obtained in the Scotch quarries.

The granite sheds of A. N. King at Tunbridge, Vt., are nearly completed and the polishing mill will be erected soon.

A granite quarry in Francestown, N. H., is the subject of a law suit in the second session of the superior court. There are two suits. In the first, Samuel Hoar, executor of the estate of the late Senator Bainbridge Wadleigh, and Laurilla H. Balch are plaintiffs, and Benjamin Dore, of Lynn, and Dr. George H. Woodman, of Newtonville, are defendants. The plaintiffs seek to recover for rent of a quarry at Francestown for five years, at a rental of \$250 a month for the first year and \$500 a year for the remainder of the term.

Over 2,000,000 paving stones have been shipped from Maine to Providence, R. I. this year.

Settlements in the granite difficulties have been made at Bridgeport, Conn., Mason, N. H., Mt. Waldo, Me., Browne, McAllister & Co., New York city, and the Maine and New Hampshire Granite Company, Red Stone, N. H.

The great granite strike at Concord, N. H. is settled at last and the men have returned to work. The agreement doesn't differ materially from that entered into in other places, excepting that it fixes the rate per hour, thirty and five-ninths cents, and specifies what work shall be piece work. The main point of contention, the employment of non-union men, is not mentioned in the official agreement as published. Why not it is impossible to say. The agreement provides for arbitration by a local board of conciliation, and doesn't allow strikes or lockouts while arbitration is pending. If change is desired, at least three months' notice must be given prior to the termination of the bill, and if no notice is given the same bill remains in force until March 1, 1898. Whatever the causes of the long contest in Concord, it is at last ended, and once more the ring of hammers resounds through the sheds. The workmen are busy, such as are left, and the outlook for good pay through the winter is rather better than loafing. It is hoped by all friends of the laboring man that this contest has been decisive, and that granite strikes will be known no more forever.

F. G. Holden, who has been manager of the Vermont Marble Company's branch at Detroit, Mich., leaves there January 1, and assumes the management of the Boston branch, which has been in the care of Mr. Allan, for many years. Thomas Coffey takes Mr. Holden's place at Detroit.

THE PYRAMIDS.

THOUSANDS of years before there were any dwellings on the sites since occupied by Jerusalem, Rome and Athens, at the very dawn of human history, when all the rest of the world was still wrapped in the thick gloom of pre-historic barbarism, a vast town of huge buildings rose not far from the present city, on the other side of the Nile, which was dotted with the boats of the ancient inhabitants. A forest of venerable date-trees cast its shadows upon the black soil, beneath which lie buried the builders of this city of a world gone by, of which nothing remains but the vast cemeteries, their position marked by an avenue of monuments. The famous pyramids of Gizeh, opposite Cairo on the borders of the desert, form the last of these necropoli.

Every one is familiar with the appearance of these strange pyramids; these huge paradoxes of strictly geometrical form, so vast and so lofty that it was not until after fifty-eight centuries of development that the human race succeeded in erecting a building of greater height, whilst the loftiest pinnacle of the most aspiring Gothic belfry, however light and airy it be, did not soar higher than the height of the pyramid of Cheops before it was blunted by time. Nothing could be more confusing to the eye than the general appearance of these heaps of stone, in which no artistic conception plays the slightest part. The effects of the perspective in these lines of mathematical regularity are most bizarre—huge bare triangles, the outlines shortened or lengthened, marked out like a diagram by the sun into flat bands of light and shade, the reflections in the sand of four mighty angles, varying according to the time of day. The sloping sides, which at a distance appear absolutely plain, are, when approached more nearly, discovered to be broken up into a series of projecting stones, like a huge staircase worn by age. It is somewhat difficult to judge at first sight of the size of the pyramid, and the best way to measure the height is by climbing it! It is at a corner where the stages, which seem to have been made for a race of giants, are divided into smaller steps, either for the sake of mortals of lesser stature or by the action of time, that the ascent of the great pyramid of Cheops is made. We start, pushed from behind by one Arab guide and dragged from above by another, with our eyes fully occupied with the dangers of the climb. Completely exhausted, altogether out of breath, and with knees too still to move, we pause at last, feeling as if we had scaled all three pyramids at once.

But, looking around, we find that we are scarcely one-third of the distance up, and see our fellow climbers looking like scattered ants upon the huge triangular mass. It is not until the platform at the top is reached, and the lungs are filled with the pure air of the heights, that any real idea is obtained of the monument of Cheops.

And what does this huge edifice contain? We must go down again to find out.

The entrance, which was walled up, is a considerable height from the ground, in one of the faces of the pyramid, and looks like the porch of a cave cut in the living rock. A dark, gloomy-looking door opens into a low, narrow passage, with floor, walls and ceiling all lined with granite, polished till it is like ice. An Arab guide, with a candle in hand, hoists you onto his shoulders and plunges with you into the slippery corridor, which descends rapidly to a hole in the rock on a level with the soil, going up again at the same angle. This opening gives access to a bare room, in which is a square hole, once the resting place of the mummy of one of the Pharaohs. The rest of the interior consists of two or three narrow passages, resembling cavities made in oak timber by the teredo, with two other chambers similar to that known as the king's, all faced with granite, without a moulding or ornament of any kind; airless inclosures, where no chink admits a ray of light or sunshine; huge masses of compact limestone, wrapped in utter night and silence. Such is the strange monument to build up which Cheops caused mountains of stone to be removed by whole nations of people, who perished at their task beneath the whips of the convict guards.
—*Harper's Weekly.*



STONE PRODUCTION—IV.*

INDIANA.

THE kinds of stone produced in this state are limestone and sandstone. Much progress has been made in the stone industry in the last ten years.

Limestone.—The limestone produced in 1889, including the value of the lime made from it, was valued at \$1,889,336. The limestone industry is a very important one in this state. The productive counties are as follows, in the order of their relative magnitude: Lawrence, \$506,471; Huntington, \$228,679; Monroe, \$195,632; Decatur, \$169,195; Washington, \$137,200; Ripley, \$112,916; Owen, \$74,227; Clark, \$65,387; Franklin, \$51,558; Putnam, \$49,606; Wabash, \$38,640, and smaller amounts from Shelby, Grant, Carroll, Cass, Delaware, Howard, Blackford, Madison, Harrison, Jennings, Adams, Floyd, Wells, Crawford, Jackson, Jay, Fayette, Miami, Randolph, Vanderburg, Wayne and White. The most productive portions of the state are the southern and southeastern. The product of these portions amounts to \$1,312,586. The limestone of the state may for convenience be divided into three general classes: The oölitic limestone, otherwise known as cave limestone, from the numerous caverns which are to be found scattered through it; second, the harder and much more crystalline variety; and finally the rock which occurs in thin strata and which is well adapted for purposes of flagging, etc. The oölitic limestone extends in a southeastern direction from Greencastle in Putnam county. This stone is commonly known in trade as Indiana stone or Bedford stone and is well known over a wide area in the United States and is an exceedingly popular building stone, not only in cities of the West, but in eastern cities as well. It has been most extensively quarried at Stinesville, Ellettsville, and Bloomington, Monroe county, and at Bedford in Lawrence county; but owing to the increased demand for this stone, new quarries are being opened and extensively worked at frequent intervals along the line of the Louisville, New Albany & Chicago railroad, from Gosport to Bedford, and these give promise of rich and practically inexhaustible supplies. This stone is almost exclusively used for building purposes, and it is the great production of this stone which enables Indiana to take second place among the states producing limestone for building purposes, Illinois standing in the first place. The stone is characterized by its oölitic character, is comparatively soft when first removed from the quarry, but hardens on exposure to air. The

*Report of United States Geological Survey for 1889-90.

deposit varies from a few feet to a great many in thickness and it is practically free from fissures. Solid walls 30 to 50 feet in depth have already been revealed without a seam or fault of any kind from top to bottom. It is easily quarried in blocks of any size required, being cut from the solid mass by means of channelers. It is soft enough to be readily sawed, ordinary steel blades, with sand as the abrasive material, being used for sawing. Occasionally diamond saws are used with fine results. For most part the stone is fine grained, but contains also layers of coarser material in which shells are easily recognized with the unaided eye. Operations in all quarries producing this kind of stone are conducted on the largest scale and the machinery employed is usually of the very best.

The harder, more crystalline stone is found in the eastern and southern parts of the state, principally in Decatur county in the southeastern part. The quarries in general are rather small, there being twenty of them in Decatur county alone. Some of the quarries are operated on a large scale, as, for example, the Greensburg Limestone Company, the Big Four Company, and a number of others. On account of its hardness this stone cannot be sawed. It is used quite largely for building purposes. In the northern and northeastern portions of the state the stone is used somewhat for building and street purposes, and in Huntington county very largely for burning into lime. The great center of the lime industry is at Huntington, Huntington county. The most important concern producing lime at this point is the Western Lime Company. The product has a widespread reputation for use in building. On account of the flagging nature of the stone in the more northern portions of the state it is often quarried simply by aid of a pick and bar. This is more especially true in regard to the northeastern sections of the state. In the northern, northeastern, and eastern portions of Indiana are a great many small quarries. A number of them seem to be capable of more extended operations, but the lack of railroad facilities from the quarries to the main lines of travel exerts a retarding influence. The stone quarried at Greensburg, in Decatur county, is decidedly crystalline, and is susceptible of a high polish. The thin-bedded stone in the upper portions of these quarries is used to some extent for flagging. The development of the oölitic or Bedford stone is largely the result of operations conducted within a comparatively few years. In a small way it has been quarried and used for twenty-five years or more, but it is within the last twelve years that the stone has been recognized and appreciated by the larger cities of the East and West. It occupies at present a very prominent position among the best building stones of the country.

Considering the purposes to which the total limestone product of Indiana is devoted it appears that the value of the stone devoted to building purposes was \$994,313; the value of lime manufactured, coming chiefly from

Huntington county, was \$340,315; to street and road work an amount valued at \$316,722 was devoted; to bridge work and light foundations \$233,710; and a small amount is used as flux. There are in all 172 limestone quarries in the state.

The following analyses may be found of interest:

ANALYSIS OF LIMESTONE FROM ADAMS COUNTY, INDIANA.

	<i>Per cent.</i>
Carbonate of calcium	54.00
Carbonate of magnesia.....	45.00
Alumina.....	.46
Silica.....	.53
Iron.....	.01
Total.....	100.00

ANALYSIS OF LIMESTONE FROM HOWARD COUNTY, INDIANA.

	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Iron.....	.001	.001	.008	None.	None.
Carbonate of magnesium.	Trace	24.74	24.56	31.69	2.61
Carbonate of calcium.....	93.10	65.03	66.92	60.01	95.50
Insoluble matter incinerated	1.62	3.08	5.56	6.84	.90
Insoluble matter dried at 100°	1.74	8.73	7.63	7.03	1.82

ANALYSIS OF LAWRENCE COUNTY, INDIANA, OÖLITIC LIMESTONE.

	<i>Per cent.</i>
Lime.....	53.55
Carbonic acid.....	43.33
Water.....	.56
Magnesia	2.56
Iron.....	
Alumina	
Manganese.....	
Phosphoric acid.....	
Silica.....	
Total.....	100.00

Sandstone.—The sandstone produced in 1889 was valued at \$43,983. It was produced in the four counties following: Warner, \$19,163; Fountain, \$14,500, and smaller amounts in Orange and Putnam counties. There are in all eleven quarries. Of the total amount produced, \$16,033 worth was used for abrasive purposes. For bridge work, etc., an amount valued at \$18,080 was used. The sandstone of Orange county deserves especial mention on account of its value for abrasive purposes. This stone is said to need no oil to soften it, but it is used with water alone, and it appears to be very popular for the purpose of sharpening tools. It has been very highly recommended for razor hones and sharpening axes and knives. It is found chiefly in the western part of Orange county, and appears to be produced in no other county of the state. Much of it is shipped in the rough to various points in New York to be sawed. There are no works with good facilities for sawing the stone in the vicinity of the quarries. The presence of

petrifications in these quarries occasions not a little trouble in working the stone.

IOWA.

Limestone and sandstone are produced in this state.

Limestone.—In 1889 the total value of the limestone product was \$530,863. It came mainly from counties in the eastern and southeastern parts of the state. The limestone quarries are in a great many cases scarcely worthy of the name quarry, the operations being extremely limited and carried on frequently as work incidental to farming. There are comparatively few large operations in the state. It will, however, be noted that the value of the total output is considerable. The productive counties are as follows: Jackson, \$97,600; Dubuque, \$96,168; Cedar, \$67,941; Marshall, \$51,400; Jones, \$37,880; Scott, \$31,081; Lee, \$20,093; Clinton, \$14,631, and smaller amounts from Des Moines, Madison, Decatur, Cerro Gordo, Dallas, Wapello, Linn, Muscatine, Black Hawk, Mahaska, Washington, Benton, Clayton, Pocahontas, Montgomery, Tama, Floyd, Adams, Mitchell, Humboldt, Johnson, Jefferson, Clark, Van Buren, Howard, Taylor, Keokuk, Pottawattamie, Louisa, Webster, Allamakee, Story and Buchanan. The number of quarries is 143. Of the total product an amount valued at \$236,792 was devoted to building purposes, while the value of the lime produced is \$170,043. The remainder was divided between street and road work and bridge piers and foundations.

Sandstone.—Eleven quarries in this state produced sandstone valued at a total of \$80,251. The productive counties are: Marion, \$61,451, and Hardin, \$10,197. The remainder producing small amounts are Cerro Gordo, Clayton, Lee, Jasper, Washington and Scott. The stone is almost entirely used for general building purposes.

KANSAS.

Limestone and sandstone were produced in this state in 1889. The limestone was valued at \$478,822, the sandstone at \$149,289.

Limestone.—This comes from 115 quarries, many of them, however, very small, and contained in the following counties of the state: Cowley, \$95,000; Leavenworth, \$65,387; Marshall, \$57,700; Chase, \$53,000; Ripley, \$52,000; Butler, \$47,000; Lyon, \$19,000; Wyandotte, \$19,000, and smaller amounts from Marion, Atchison, Wabaunsee, Shawnee, Washington, Johnson, Russell, Dickinson, Franklin, Morris, Elk, Brown, Douglas, Republic, Pottawattamie, Coffey, Anderson, Jefferson, Ness, Montgomery, Jackson, Harper, Sumner, Ellsworth and Osage. The stone is pretty well distributed over the eastern portion of the state. Most of it, however, comes from the vicinity of Atchison, Leavenworth, Topeka, and Fort Scott. Of the total production an amount valued at \$269,316 was used for building purposes.

The value of the lime product is \$9,013. For street work \$97,502 worth was used; and for bridge, dam, and railroad work an amount valued at \$102,991.

The following is an analysis of Cowley county limestone made by Prof. F. W. Clarke, of the United States Geological Survey:

ANALYSIS OF LIMESTONE FROM COWLEY COUNTY, KANSAS.

	<i>Per cent.</i>
Silica.....	5.27
Water.....	.78
Ferric oxide.....	.71
Ferrous oxide.....	.32
Alumina.....	1.07
Carbonic acid.....	40.34
Lime.....	50.36
Magnesia.....	.56
Sulphuric acid.....	.07
Phosphoric acid.....	.06
Soda.....	.20
Potassa.....	.10
Total.....	99.84
Matter dried at 100°.....	

According to the tests made in Washington a two-inch cube crushed at 29,490 pounds.

Sandstone.—The sandstone product came from the following counties, named in order of value of output: Bourbon, \$90,000; Phillips, \$35,086; Rawlins, \$18,000, and smaller amounts from Crawford, Woodson, Clark, Wilson, Kingman, Harper and Comanche counties. The sandstone is found in all parts of the state, but the most productive portions are in the south and southeast. The product was used mainly for street work, a smaller quantity being devoted to building purposes.

William C. Day.

(TO BE CONTINUED)



"STONE'S" MISSIONARY IN MICHIGAN.

FIRST hewn logs from the "forest primeval," then pine lumber, then yellow brick from Milwaukee, and now stone. This is the record of the progress of building materials in Michigan. Time was when the "Wolverine" esteemed himself fortunate if he could gather together enough stone for an "underpinning" to his barn. Now his state produces an abundance of the finest quality of building stone. In the southern portion of the state, however, where building operations are the liveliest, little else but an inferior quality of sandstone is found and the towns located therein being quite as near other stone producing states as they are to the upper peninsula, one finds nearly every variety of stone in use. Up at Muskegon, for instance, I found within two squares oölitic limestone from Bedford, serpentine stone from Pennsylvania, sandstone from Ohio and red and brown stone from upper Michigan in buildings erected within the past year, comprising a public school house, a church, private residence and a very pretentious addition to the Occidental hotel.

Over at Grand Rapids the same condition prevails, the lake ports are not so far distant but stone from neighboring states is brought to their doors at extremely low rates. At Muskegon Messrs. Goodall Brothers have erected sheds on the G. R. & I. R. R. docks, well supplied with the most modern machinery from the Scoville Iron Works, Chicago and the advent of this enterprising firm there has marked an era of decided progress in building operations there and at neighboring points. At Grand Rapids Alex. Matheson and Anton Hirth easily lead in supplying stone for building purposes. The former handles the choicest varieties of marble and granite; does interior finishing, fancy entrances, etc., also monumental works, while the latter works in soft stone entirely. In his yard may be found red and brown stone from Lake Superior, oölitic stone from Bedford and sandstone from the Euclid, Berea, and Grafton districts. Some very elegant buildings of modern construction and quite metropolitan in character have been erected during the past year. There are the new county court house, the public library, the Michigan Trust Company's building, together with many others remodeled and improved. It is a significant fact the better part of the material in every case is stone.

At Kalamazoo the new postoffice challenges admiration, bearing little resemblance to the conventional public building. Brownstone is the principal material used. Several fine residences and a few business blocks have been

erected within the past year, the trimmings of which consist variously of brownstone, sandstone and limestone. Considerable paving has been done this year, vitrified brick mostly, with a good quality of Ohio sandstone for curbing and flagging.

At Jackson, building operations are not lively. Mr. Conway, the principal builder of that city, has the contract for remodeling a store building to furnish quarters for the Jackson City Bank, which has tired of a brick front and is having Mr. Conway put in a very elaborately carved one of Bedford stone from the Hallowell Stone Company. He says Ohio stone has been used for years but they are now trying limestone. The government building there is the largest stone job put up in the history of the town.

At Detroit a brisk rivalry exists among representatives of stone companies located variously and everything is found from the soft stone, almost within the borders of the city, to jasper from Iowa, of which hard material an elaborate residence is being erected out on Woodward avenue. The carving alone represents a greater cost than the material for most residences and it is estimated will require six months longer to finish, owing to the extreme difficulty in working this peculiar stone.

Ira P. Rowley.

THE HOUR-GLASS.

"What eye with clear account remarks
The ebbing of the glass,
When all its sands are diamond sparks
That dazzle as they pass?"

Now, I do not quite agree with a friend of mine whose motto is that if business interferes with pleasure, you had better give up your business. But I do say that we should relieve ourselves from too steady and long-continued strain in pursuit of the mighty dollar, by frequent periods of rest and recreation, of evening occupation, to take the thoughts from business as a preparation for the sleep that knits up the raveled sleeve of care, and recuperates us for to-morrow's duties. Almost any diversion, whether of pleasure or study, will serve the purpose. It may be a summer trip to the seashore or mountains, or a winter visit in the South; if this is not feasible, it may be only a day or two in the woods or on the streams with care naturally left at the shop. You come back with clearer brain and stronger grip ready to do your part.

If even such slight vacation is not possible a night at the theater or opera or any little social diversion, possible in any pleasant home will do. The church or lecture room, or clubs for the discussion of any topic except bus-

iness may, with many, be equally as effective means of recreation to some as more active amusements would to others. It matters not what the form, short of dissipation, provided the end is attained.

I have found occasional relief in writing a page or two for MILLING, after business hours, though, if I had to complete such as a daily task, probably I would be glad to get away from it even to the mill or office.

It is a healthy sign that our regular and occasional holidays are increasing and that merchants and business associations are more disposed to observe them and to permit employes to do so. Such days are not lost, they prolong our term of usefulness, and we can do enough more work to make up the average. There is, however, one thing in connection with holidays which I may be singular in deprecating, that is, that they are usually the occasions for drawing immense crowds to central points, involving discomforts and weariness, overbalancing the pleasure, though, on the other hand, countless hosts use such days to get away from the crowds and therein they choose the wiser part. Away from sky-rockets and turmoil, from the whistle of the locomotive or the yell of the newsboy, tire yourselves out physically in pursuit of your favorite sport with never a thought of business until you come back to it, thankful for the holiday that allowed you to forget. Occasional rest is the true preventive of brain trouble. Even the steam engine has to take every seventh day off and if we would preserve our power for work to the longest limit we must intersperse play with it. If we carry cheerfulness with us into our daily occupations it will lighten the burden. Let us see diamond sparks instead of sand ebbing in the glass and we will realize the poet's expression of

"How noiseless falls the foot of time
That only treads on flowers."

Alex. H. Smith.

BETTER THAN ALL COMBINED.

"Send *STONE* for one year. It is worth more than all other papers published in the interest of the stone trade combined.—*G. T. Gossett, Reidsville, N. C.*"

MICA.

THE name mica is not that of a single mineral, but is a family cognomen, which includes a number of varieties. With the outward attributes of the family we are all familiar, for under the common name of isinglass it forms a small part of the stock in trade of every householder. The family is one of some importance in mineralogical hierarchy. All are shining members, and are alike in splitting into extremely thin leaves or plates; in being more or less transparent; in being highly elastic; and in having certain ingredients in common. There are seven well-defined minerals which lay claim to the family name, besides an extensive list of relatives which have been formed by alteration or exposure to air and water. The series runs from the compact, glistening mica found in granite and gneiss, through many gradations of hydrous micas, until we reach the ordinary soapstones and clays. But the name properly stops when the mineral loses its glistening surfaces, for then the Latin word *micare* (to shine) no longer applies. Our German friends call it *glimmer*, a name whose significance is readily seen.

The location of the quarries has been largely accidental. So far as I have been able to learn, the first one opened was the Sinkhole in Mitchell county, N. C. The spot was marked by the existence of trenches, many hundred feet long in the aggregate, and in places fully twenty feet deep. Large trees growing on the debris indicated that the workings were very ancient.

Then, as now, the mountaineers were largely guided in their search by the ancient workings. These were probably made by the aborigines, and were also for the purpose of obtaining mica. The imprint of their stone implements may still be seen in the decomposed stuff at the sides of the opening. What these people used the mica for is still problematical. Large plates of it have been found in the mounds of eastern Tennessee, and would indicate that it had domestic application, or was used for personal decoration. The mica is seldom prepared for market at the quarry, but is taken to a conveniently located glass-house. This generally means a transportation of several miles. Frequently the quarries are on steep mountain sides, and are only connected with the outside world by the roughest sort of trails. In this case the mica is "packed" down the mountain on the backs of men to the wagon road in the valley below. At the glass-house the mica is put into shape for shipment. The blocks vary greatly in size. One from the

Wiseman quarry, near Spruce Pine, is reported to have been six feet long by three wide. Pieces a yard in diameter have been obtained at the Ray quarry, in Yancey county, and similarly large plates have been found in Siberia, but these are exceptional. The average size of a block is a little larger than the page of a magazine, and is generally less than six inches in thickness. It separates very readily into sheets parallel to the base of the prism. It is estimated that this cleavage may be carried so far that it would take three hundred thousand of the mica plates to make an inch. It is needless to say, however, that such a thickness is not suitable for use in stoves and furnaces. The mica is generally split into plates varying from about one-eighth to one-sixty-fourth of an inch in thickness. In preparing these plates for market, the first step is to cut them into suitable sizes. Women are employed in this work, and do it better than men. The cutter sits on a special bench which is provided with a huge pair of shears, one leg of which is firmly fixed to the bench itself, while the movable leg is within convenient grasp. It is requisite that the shears be sharp and true, for otherwise they will tear the mica. The patterns according to which the mica is cut are arranged in a case near at hand. Generally they are simple rectangles, varying in size from about four square inches to eighty.

The cutter selects the pattern which will cut to the best advantage, lays it on the sheet of mica, and then, holding the two firmly together, trims off the edges of the mica to make it correspond with the pattern. When the cutter completes her task, she has all the mica piled away in little bundles under their corresponding patterns, while the scrap falls in a glistening heap on the floor. The cleaning process comes next. The cleaner must examine each sheet of cut mica by holding it up between her eyes and the light. If there be any imperfections, they must be removed by stripping off the offending layers of mica until a clear sheet remains. The cleaning is done by means of a sharp penknife—and considerable discretion. It is quite easy to tear away the entire sheet and have nothing left for one's trouble. Both the cutting and the cleaning are tiresome routine operations, yet there is a certain fascination about tearing the mica to pieces that few have philosophy enough to resist. Finally, the cut and cleaned mica is put in pound packages and is ready for market. There is an enormous waste in the process of preparation. One hundred pounds of block mica will scarcely yield more than fifteen pounds of cut mica, and sometimes it is even less. The proportion varies, of course, with different localities.

The chief use of cut mica is in stoves, and its comparative cheapness has made possible the luminous—not to say artistic—wonders which constitute the latest and most cheerful creations of the stove men. The sheets are also used in the peep-holes of smelting furnaces, in lanterns, in shades, and in the port-holes on board naval vessels, where the vibrations would soon

demolish less elastic glass. Mica is an excellent non-conductor, and of recent years has been cut to some extent into narrow strips for use in the construction of dynamos.

The scrap mica was formerly thrown away, with the exception of a small quantity used as a lubricating material, but it has recently found a market in several new directions. Old waste heaps are being bought up, for a few dollars a ton, and their contents cleaned by being passed through a big mill. This is simply a rotating cylinder of coarse wire screen with its axis slightly inclined to the horizontal. The scrap is fed into the upper end of the cylinder, and slowly discharges itself from the lower end. As it makes its way from end to end, the sand and trash fall through the meshes of the screen.

The cleaned scrap is then ground into a coarse powder and distributed to the various industries requiring it. Large quantities are used in the manufacture of wall paper. The mica produces a sparkling surface which is thought to be decorative, but at best the effect is somewhat bizarre. Considerable amounts are used to produce the snow effects on Christmas cards, and in stage scenery and other tinsel; while smaller packages, under the name of diamond dust, are sold as powder for the hair. Much of the ground mica is sent to France, and this, oddly enough, when the East Indian sheet mica is pressing our own pretty heavily in the home market. The Latin world used the mica dust to strew over the Circus Maximus, while mediæval Europe knew the golden and silver scales as cat-gold and cat-silver.—C. Hanford Henderson in *Popular Science Monthly*.

SLATE DEPOSITS.

THE analysis of slate shows that its principal ingredients are silica and alumina. Slate is pronounced by many people to be aluminous clay. It contains a small percentage of carbonate and sulphate of lime. Peroxide of iron is also found in slate. Green slate contains but little if any iron. The purple and red take their color from the iron they contain. The presence of slate is determined by the outcrop upon the surface. The average citizen with a limited amount of intelligence, possessing the necessary qualifications for success, pluck, perseverance and muscle is better equipped to solve the problem in regard to the exact location of a slate deposit than is the most scientific mineralogist.

But very few quarrymen, if any, are thoroughly confident of meeting with success in developing the slate quarry. It frequently occurs that the most experienced quarrymen lose their all in some unfortunate venture of this kind, while some inexperienced workman may find the larger bed and larger compensation with little effort. If success in quarrying slate were

an absolute fact, and if there was no question regarding the location of the deposit, then a condition of things would exist directly contrary to the present. The laborer would then be the capitalist. The risk which surrounds the average quarrymen makes capital imperative. Time, money, patience, and all the modern appliances are necessary and indispensable requisites in slate quarrying.

In order to connect the past with the present, so far as it relates to the original deposits of slate, it might be stated that geologists have been unable to form a continuous history of rocks from the remains of plants and animals found in them. Hence it appears that there is a diversity of opinion among these men regarding the early formation of slate deposits.

One of these gentlemen thus states his opinion regarding slate in its earliest stages, which conforms to natural laws and is as authentic as anything written upon this subject. It is as follows:

"It is said that the slate beds have been formed ages back, at the bottom of the seas, where mud had been washed by rains from the old lands and carried by rivers into the seas. Most of the mud was made up of feldspar, with smaller amounts of lime, magnesia, iron, potash and carbon. The mud deposited in layers or beds in the bottom of the seas, in course of time got covered with other materials. The whole mass, slowly hardened and consolidated by pressure and heat, lifted out of water. It cracked and split in various directions while in process of drying. Influenced by that law of crystallization by which all minerals assume certain shapes, the mass split up into rhomboidal masses. After this came the great disturbing forces by which the beds were bended and twisted in all directions. The great pressure on these lay between the N. N. W. and E. S. E. Between these two points the particles of the mass became flattened and compressed into about half its original bulk and thus was imparted to an unbroken mass of rock that lay between these cracks and divisional planes that had a tendency to peel off from each other and is now called slaty cleavage."

There is great similarity in the location of slate deposits, whether in Pennsylvania, Maine or Vermont. We generally observe the outcropping of slate on high lands or mountains, with a depression at the base, which extends to another range of elevated land. Take, for instance, the slate beds of Vermont and New York, we find that they are located in and about an extensive range of hills, the valley which properly extends from Castleton, Vermont, to Salem, N. Y.

The slate section of Vermont and New York is located at the southern trend of the Adirondack mountains and in close proximity to the Champlain valley. The valley in which are located the slate deposits varies in width from one mile to five miles and narrows down at the northern extremity leaving but a limited space for travel between two mountains previous to

entering the Otter Creek and Champlain valleys, lying at the base of the Green mountains. From their sides are taken marble, granite and other minerals. This range forms the eastern bulwark of this great valley, while the Adirondacks perform a similar duty on the west side of the Champlain valley.

The Adirondacks commenced their duties at a very early period in the geological history of the earth. They belong to the Archean age—sometimes called the iron age on account of the presence of iron. Graphite, granite, mica schist, hornblendic rocks and crystalline limestone are the principal mineral deposits of this range of mountains.

The people of the state should be prevailed upon either by the press or through missionary efforts to elect men of ability and sense to the legislature who would see the importance of developing the mineral interests of this section. A complete annihilation of all sense and decency was exemplified in advertising the abandoned farms of Vermont, in making an appropriation of \$30,000 annually to a lost cause—that is to the farming interests—and at the same time appropriating only \$400 for geological purposes.

These legislators ought to see at a glance that the mineral deposits which are beneath and form the foundation of the abandoned farms are of more value than all agricultural interests combined.

The slate, granite or marble interests have been developed by men of moderate means. A large number of the producers have labored under adverse circumstances. They have received no financial assistance from the state, nor do they ask it. It is the undeveloped resources which need attention in this direction.

The advantages of any state should be advertised instead of bringing before the world the disadvantages of any particular locality.

Geo. H. Harris, in American Slate Trade Journal.

FREIGHT TRAFFIC OF THE MISSISSIPPI.

THE importance of the Mississippi river and its various tributaries in the transport of commercial products, is hardly susceptible of an overestimate. The great arterial waterway with its august auxiliaries and its tributary empire of states, in the development of internal trade both immediate and prospective, has a destiny peculiarly its own. The twenty-two states and territories contiguous to these waterways represent not only huge areas of domain, but an equally imposing distribution of commercial energy and material resources. In short, the trend of trade and population is along the highway watered by the streams that converge from the northern latitudes to the warmer zone of the gulf.

The following statistics as furnished by a report on the internal commerce of the United States for the year 1891, made by S. G. Brock, chief of the bureau of statistics, treasury department, illustrates forcibly the commercial importance of the trade and traffic of the Mississippi and its tributaries:

FREIGHT CARRIED ON THE UPPER MISSISSIPPI AND MISSOURI AND THEIR TRIBUTARIES,
THE OHIO AND ITS TRIBUTARIES, AND THE LOWER MISSISSIPPI
AND ITS TRIBUTARIES IN 1890.

Coal	8,539,229
Forest Products	9,300,641
Merchandise	6,737,075
Wheat	848,442
Cotton	896,292
Iron ore	574,790
Cotton seed and oil	394,788
Corn	786,888
Sugar	190,873
Animal products	177,376
Stone and gravel	178,631
Clay and sand	142,423
Manufactured iron	192,110
Mill products	90,895
Hay	91,579
Other grain	95,588
Fruits and vegetables	59,610
Tobacco	27,959
Pig iron	7,775
Oils	3,538
Ice	91,010
Cement, brick and lime	2,375
Miscellaneous products	75,159
Total	29,505,036

In this grouping of products we have a fair profile of the diversified industries and resources of the several states traversed by the Mississippi and its feeders, of which the aggregate tonnage is as magnificent as its constituent factors are diverse. These totals, however surprising, are as yet but an approximation. Much remains to be done in river improvements and the removal of obstructions to more continuous and less hazardous navigation. This is but a question of time and rightly directed enterprise, which, when completed, will make the Mississippi valley and contiguous territory of commanding importance in the industrial and commercial future of the United states.—*St. Louis Lumberman*.

BEST ON EARTH.

"Of course we want STONE. Best on earth."—*Terre Haute (Ind.) Stone Works Co.*

GREYWACKE OR ARKOSE.*

IN some parts of our region a rock which may be described under either of the above names is met with in great abundance. It has some resemblance to sandstone, but does not usually occur in distinct beds with parallel faces, and is generally either massive or divided by joints or a rough sort of cleavage. Under the hammer it breaks readily, and may be easily bruised or scratched, thus showing the presence of a considerable proportion of ingredients softer than quartz. It has an ashy appearance, and its color is usually some shade of ash-gray. On closer examination it is found to consist of comminuted granitic *debris*, and generally holds quantities of pebbles and angular fragments of all sizes of the granite itself. The latter are mostly of the same character in all parts of the district, and consist of binary granite or quartz-feldspar rock of either red or gray color. Fragments of gneiss and other crystalline rocks are occasionally mingled in small proportions with those just described. Under the microscope the matrix or finer portion of this rock is seen to consist of somewhat rounded grains of quartz, and more angular ones of feldspar, with a filling of fine sericite or of some dark amorphous mineral.

Rocks of this kind occur here and there in almost all parts of the Huronian belt within our region, but they are particularly abundant in the narrowed portion in the Sudbury district and around Temagami lake and Rabbit lake to the east of it. They are also common in Onaping and Straight lake outliers and all along the Spanish river, below the granite area, and thence westward as far as Mississauga river.

Sometimes, as on the Montreal river, the included fragments of granite attain the size of boulders, and these, as well as the smaller inclusions, may occasionally be found so closely packed together that only the interstices are filled by the finer material. The fragments are most common in the greywackes where the latter occur in large volume, and in these cases there is little evidence of stratification. The more uniformly-grained varieties, without angular fragments, are often found interstratifying quartzites, as in the Sudbury and Whitefish lake regions, and they may be seen containing every proportion of quartz grains till they themselves become quartzites.

There was no doubt great volcanic activity on earth at the time these greywackes and their associated rocks were being formed. The thick unstratified and brecciated masses of greywackes may represent volcanic ashes

*Report of Ontario Bureau of Mines.

or mud with stones thrown out upon the land or in shallow water, while the stratified varieties may have been similar ejectamenta thrown into deeper water and modified by the currents or waves of the sea. Some of these rocks, whether stratified or otherwise, may represent volcanic products which were originally poured into the sea in a molten condition and became broken up and disintegrated. The glass breccia already referred to as forming such a thick belt in the Sudbury district is direct proof of volcanic activity with explosive violence on a scale probably grander than any such action in modern times. Even without this and many other proofs which might be cited from the earliest records of the rocks themselves, it would only be in accordance with the general geological history of the globe to believe that volcanic or igneous action was going on upon the surface more generally and on a greater scale in the earlier than in the later geological times.

From a study of the greywackes and the rocks associated with them there would appear to be little doubt that the former constituted the crude material from which the quartzites and clay-slates were derived by the modifying action of water. Again by the action of time, pressure, electricity, and perhaps other metamorphosing agents upon different varieties of greywacke, some of our granites, syenites, gneisses, felsites and possibly other rocks were formed. Many instances were noted in the Sudbury district where the more massive greywackes exhibited a proneness to revert to granite again, while some of the stratified varieties showed different stages of their passage to gneiss, and again certain of the finer-grained and more homogeneous kinds had been altered into felsites.

ENJOYS READING "STONE."

"I always enjoy reading *STONE*, and wish you to send it to me during the year 1893."—*Geo. C. Winslow, Kalamazoo, Mich.*

THE BEST IN AMERICA.

"Having been familiar with your magazine for some years past, I take pleasure in saying I consider *STONE* the best publication of its kind in America.—*E. T. Manning, New Orleans, La.*

TRANS-ATLANTIC NOTES.

THE result of the presidential campaign was looked for with intense interest on this side of the Atlantic. There is no doubt that the McKinley tariff was a severe blow to many European industries. It is now confidently expected that trade between the old world and the new will soon resume its old channels. But, if the British tin-plate trade and some other trades have been seriously affected by a high tariff in the states, little effect seems to have been produced by the same cause upon the marble and granite trades. Reports from Scotland speak of the demand for Scotch granite as being well up to the average. There has been no lack of orders, from American sources, for Italian marble; while from Belgium I hear of a substantial increase in the export of manufactured marble during the past twelve months.

Some large orders have been secured by Belgian manufacturers from some of the western towns, notably from Chicago. One of these calls for a quantity of Italian vein marble. This marble seems to have been greatly neglected by importers of late years, who have rather favored the lower grades of Sicilian. It is true that vein marble is quite unsuitable for out-of-door work; but for interior decorations, such as wall panneling, and the like, it is hard to beat. It is not always easy to obtain the finely-penciled variety, but it is well worth a little trouble to get it in perfection. At all events, judging from reports received from Belgian sources, there seems likely to be a considerable demand for it from your side.

A determined effort to push business is being made by the owners of the Saillon quarries in Switzerland. They have established a branch establishment in London and have spent a considerable sum of money in exhibiting the produce of these quarries. From there, several marbles are obtained, but the principal are those known as "Vert Moderne," "Grande Antique Cippolino," and "Ribbioned Cippolino." "Vert Moderne" comes from the lower stratum; the bed is eight feet to nine feet in thickness and the color of the marble is greyish green, crossed by a darker close green network of veins. "Grande Antique Cippolino" is obtained from a bed three feet in thickness, the color of the marble being of a light ivory, with dark greyish blue, green and violet veins. "Ribbioned Cippolino" is found in a bed four feet in thickness. It is darker than the "Grande Antique," its color being a yellowish ivory, with greyish violet, and dark green veins.

In London great progress is being made with the new National Portrait

Gallery. The main building will be at the back of the present National gallery in Trafalgar Square. It will be a handsome stone edifice three stories high. The basement will be of Cornish granite, and the superstructure of Portland stone. The latter stone has been selected, as that which, upon the whole, best stands the London weather and the London atmosphere. The main building has now reached the full height, and the coping stones are being placed in position. This part of the work proceeds somewhat slowly on account of the large dimensions of the stones. Some of them are nine feet long by eight feet broad and three feet in depth. Such masses of stone of the best quality are not quarried every day, and can be got only at such intervals as good luck may permit. But the greater part of the work has now been done, and the principal building is practically ready for the roof. Another two years will run before the full time for the completion of the work will expire.

Work at the Imperial institute is also being actively pushed forward. The site of this building is one that must be familiar to all who visited the series of international exhibitions in South Kensington, which came to an end in 1886. The structure itself is over 750 feet in length, and it is surmounted by a large square tower which, when completed, will, with the dome-shaped cupola, be nearly 300 feet in height. The great hall will be 128 feet long, by 60 feet wide. It will exhibit a diversified use of various marbles, and of Indian teak panneling, with a richly coppered and vaulted ceiling. The west stairway is finished. The steps are of Hopton Wood stone; whilst the baluster and rails are of marble. The walls are also lined with specimens of British and Colonial marbles. The windows display the arms of the United Kingdom, and of the different colonies, and emblems of the Indian empire. When entirely finished, the expenditure on the building will be something like £360,000.

Do the American owners of granite quarries keep a sharp lookout for metallic minerals? According to Capt. Josiah Thomas, who is a great authority on Cornish tin mining, all the tin fields of the world are situated either in granite or very near to it. In hard grey granite no ores of value are ever found. But tin is generally found in granite of a softer and more jointy character, containing large quantities of feldspar; or in compact slate rocks in the neighborhood of granite, and at no great distance from it. Copper is usually found in slate rocks, which frequently contain porphyry dykes, or "elvan courses," as they are called in Cornwall; whilst lead is generally found in softer schistose strata of a more slaty character, and farther away from granite than either tin or copper. At a greater distance from granite still, in paving or roofing slate, no metallic minerals have ever been discovered in Cornwall.

The British trade generally is sluggish; but in the building trades, the

past year has been a fairly prosperous one. Wages have risen, and employment has been good. This has been especially the case with stone-masons. A prominent official of the Operative Stone-Mason's society only recently stated that the members of his society "had not had such a good run for years. There has been a great demand for masons everywhere, but particularly in London, where employment has been found without difficulty. The demand is now slackening, owing to the approach of winter, but among English masons the year 1892 will be remembered as one, in which, to use the words of the secretary of their union, "they have never remembered better trade."

Arthur Lee.

NORTH CAROLINA MINERALS.

A LONG chain of counties in western North Carolina are mountainous. From the Virginia border to the South Carolina line extend the ranges of the Blue Ridge and the Smoky mountains. The highest peaks in this sky-land are Mount Mitchell, Mount Pisgah and Clingman's Dome. On these mountain slopes are found many valuable minerals. In few other places are there such a variety of metallic, clay and stone deposits. The collection equals the tropical vegetation for diversity.

Corundum is found in large deposits in the valley west of the Blue Ridge, extending from the wooded peaks of Black mountain to northern Georgia. It is second in hardness to the diamond and has a ready market, being used extensively in the manufacture of emery wheels. These wheels are made in Pittsburg, Detroit, Chicago and Philadelphia, and bring from \$160 to \$180 per ton. Large quantities of corundum are shipped north weekly.

Talc, a very fine quality of soapstone, is obtained in immense deposits in Macon and Cherokee counties. It has been worked for years, and will be for many years to come. It is extensively used in adulterations of soaps, paints, etc., and brings \$18 to \$20 per ton at the diggings. It is the same as the celebrated French chalk, used for marking clothes, etc. Mica, which forms an important product in western North Carolina, is found in Buncombe, Ashe, Mitchell and Jackson counties and has been successfully quarried in all of them. It ranges from \$35 to \$500 per ton, the average price being about \$350 per ton.

Marble is found in a number of places. In Macon and Cherokee counties along the Nantahala river are fine beds of marble of excellent quality. The stone is of many colors and receives a fine polish. Quarries of granite, sandstone, limestone, porphyry and many other species of valuable and fancy rock and are found over large areas of mountain territory. Nearly 100 varieties of building stone can be had of many colors.

J. N. Ingram in Manufacturers' Record.

COMPETITION AMONG ARCHITECTS.

THE American Institute of Architects has set the seal of its disapproval upon the advisability of submitting, or being required to submit, competitive designs. The institute believes that such competition always results in harm, not alone to the architect, but to the general public as well. The institute recognizes, however, that under present conditions, some sort of competitive submission of designs, is practically unavoidable, and at a recent convention in Chicago adopted resolutions which have a tendency to limit, as far as possible, the evils of the system. The interest which the institute takes in the matter may be understood when it is stated that the resolutions, given below, were adopted without a dissenting voice:

1. An experienced architect of repute should be engaged by the owners at the start as consulting architect throughout the competition. All the papers and correspondence should be controlled by him. Of course he will not participate as a competitor.
2. The rules and restrictions should be as few as possible, and so explicitly stated as to prevent misunderstanding.
3. Two kinds of competition are customary, viz., an open and a limited competition. In the latter a certain number of architects are invited to submit designs and all others are excluded. In the former the competition is open to every one. An open competition is often preliminary to a limited competition confined to those architects (usually three to six in number) whose designs received in the open competition have been placed highest.
4. Every invited architect should be paid for his competitive design the schedule commission of 1 per cent. on the estimated cost of the building. The architect whose design is placed highest should be guaranteed the work at the schedule fee of 5 per cent. for plans and superintendence. Unsuccessful designs should be returned free to their author immediately after the reward is made—no portion of them to be used without the consent of their authors.
5. The site of the building should be given and the requirements as to accommodation, cost, etc. It might be well to arrange the requirements in two classes, viz.: those which are arbitrary and must rigidly be adhered to, and those which are advisory only. As a rule owners will find their interests promoted by making the list of arbitrary conditions as small as possible.
6. All transactions relating to the competition should be in writing and recorded and open to the inspection of each competitor.
7. A date should be fixed within which the awards should be announced and all premiums paid.
8. After the award all drawings should be open to the inspection of all competitors for at least twenty-four hours. In many cases an exhibition open to the public would be desirable.
9. The selection and premiation of the designs should be made by a jury of which at least two-thirds should be disinterested and experienced architects, whose report should be in writing, and accessible to each competing architect.

HIS CHILLY MIND.

DIOGENESE PERKINS, like most of us, was an anomaly. That is, he was a cold-blooded person, yet he had an ardent imagination. He went through the August heats in New York in a state of absolute calm, and if anyone had asked him to wear an overcoat while the thermometer was at 90° he would have done it. In winter he was never warm enough, and he had a terror of snow and ice and draughts. Probably his very exuberance of fancy made the cold seem worse than it really was, just as others of us are inclined to fret the thermometer about ten degrees farther up than it actually goes, during the dog days. Mr. Perkins was one of fifteen boarders at the establishment of Mrs. Tomlinson, and his appearance at the table during the summer was a delight to everybody else, he was so cool and imperturbable that his presence was better than an electric fan or a fly disturber, and his talk was filled with poetry and romance. There was only one thing against Perkins, in the minds and stomachs of his fellow sojourners, and that was his extraordinary and reprehensible fondness for pie. No doubt the reason was that the grease and sugar in this comestible had a heating effect on his system, and that was why he craved this particular article of diet. But it was disagreeable to the other boarders to be served with a half slice of pie when they were aware that the benefits of three whole pieces, the apex of each forming a distinct right angle, had inured to the benefit of Mr. Perkins. To be sure, Mrs. Tomlinson might have made more pie, but this was a boarding house and a New York boarding house, too.

The fact was that Mr. Perkins was early at the table, so as to arrive at the pie period of the feast sooner than the others, or, if he were a trifle late he raced for first place, casting furtive glances at the plates of the company while he ate his way through the soup, the meat, the vegetables and the bread. There was always plenty of bread on Mrs. Tomlinson's table, for she had some generous ways. The other boarders could not fail to observe the singular fascination that pie had for Mr. Perkins, and the more exacting of them complained that they were not being fairly treated in this contest, as Mr. Perkins was a clerk at King & Naylor's, which was from four to eighteen blocks nearer the boarding house than the shops where the others worked, and they could not reach the table as soon as he, even though he did go to his room before dinner to change his cuffs.

This matter was up for discussion several times at the door step conven-

tion, which was held every evening after dinner, this particular subject being on for debate during the minutes that elapsed between Mr. Perkins' ascent to his room on the fourth floor and his return with a rug to keep the night air off. Two or three of the younger men, whose sweet tooth was still sound, resolved at last to make an experiment to ascertain if Mr. Perkins' hold on the pie end of the dinner could not be shaken. After his peculiarities had been canvassed a course was resolved on and it was put into action the next evening.

Mr. Perkins was just cutting into the roast, and pie was imminent within ten minutes. The others were scraping up the last of the soup, when the floor walker at Rosenbaum's said to the head clerk in the silk department at Lacy's, "Curious thing, that, about the collision of that ship with an iceberg."

"On the contrary," replied the clerk, "it's a wonder there isn't more of just that sort of thing, for the banks are full of ice in July."

"When I crossed in '89," put in the buyer for Haman & Co., "I saw six of those bergs in one day. O, my! wasn't it cold when we got to the leeward of them! I can imagine them as they looked then, so vast and white, with cold waves breaking against them, and their chill breath stealing across to us. B-r-r-r-r-r!"

"Isn't there a draught, somewhere?" inquired Mr. Perkins.

"It was on that trip that a sailor told me about his experience on a whaler in the Arctic. 'One co-o-o-old night,' said he, 'just as the sun was sinking for the last time, and the half year of gloo-o-o-om and sto-o-o-orm and and co-o-o-old was setting in'—"

"Dear me, what a way of expression you have!" interrupted Mr. Perkins.

"But you should have heard that sailor tell it, as we huddled for warmth under lee of the galley. 'One co-o-o-o-old night,' said he, we were separated from our ship and were tracking toward her across-s-s-s the ic-c-c-ce'—"

"Dear me, how sibillant your pronunciation is! Like the wind," exclaimed Mr. Perkins.

"So I have been told," answered the speaker. "'One co-o-o-old night as we were tracking across the ic-c-c-ce, we heard a roaring sound. Horror! The floe had parted, and we were cut off from the ship. Our blood ran co-o-o-o-old in our veins at the awfulness of our situation. O, how the wind ho-o-o-wled and mo-oaned! Our breath turned into ic-c-c-ce in our whis-s-s-skies, and our words fell in the form of snow at our feet. We were debating as to the way of bridging the gap across the floe, when we noticed signals from the ship, but as the rockets burst at a great elevation, they also froze, and the stars came down as lumps of ic-c-c-ce. We had no means of answering and the gap grew wider and wider. How that wind searched through our marrow! Oh, how cold it was! B-r-r-r-r!"

"Goodness!" ejaculated Mr. Perkins, "what a draught!"

"Yes," said the speaker, surreptitiously wiping the perspiration from his brow, "there's a cold wind somewhere. Well, one of the sailors attempted to spring across the chasm on a piece of floating ic-c-c-ce, and fell in. We rescued him, but not until he had been frez-z-z-zen into a solid mass-s-s-s of ic-c-c-ce.' Wow! what a fate!"

"Please not to say anything more about it," begged Mr. Perkins.

"We moved up and down the edge of the desolate floe—freez-z-z-zing—freez-z-z-zing -- for we were obliged to keep in motion, and still the icy gale whiz-z-z-z-zed across the limitless snows and the gr-r-r-rinding ic-c-c-ce pack."

"At-choo!" sneezed Mr. Perkins.

"At last a great ic-c-c-ce block swung into the gap, making a temporary bridge and we sprang across it as quickly as our numbed limbs would permit; when a strong blas-s-s-st of wind came: Bz-z-z-z-z-z!"

"O, my!" exclaimed Mr. Perkins, turning up his collar.

"On reaching the main floe we discovered we had left our companion behind, but he was dead; a co-o-o-old, co-o-o-old corpse, and the sno-o-o-ows would be his winding sheet, while the freez-z-z-zing gales would sing his requiem."

"There! I can't stand it any longer," said Mr. Perkins. "I'm going up for my coat. Then, can I sit in the kitchen by the range for a little while, Mrs. Tomlinson?"

"I hope you ain't got malaria, and I should think you'd enjoy stayin' and hearin' the rest of Mr. Bilderson's story. As for myself—"

But Mr. Perkins was gone.

"What's the rest?" inquired the junior boarder, at the lower end of the table.

"There isn't any more, except that the men got back to the ship and found a fine supper waiting for them with any amount of fresh canned apple pies for dessert. That reminds me, pie, please."

"What a lot of pie there is to-night," murmured the junior boarder to the next man.

"Well, it's a succes," said Bilderson, enigmatically.

C. S. Montgomery.

WHAT AN ADVERTISER THINKS OF IT.

"We are very well pleased with the results so far, and consider STONE the most valuable we could find for our purpose."—*Seward & Co.*

Bloomington, Ind., Dec. 7, 1892.

WHERE MAMMON REIGNS.

I DREAMED, and lo, I wandered in my dream to a land whose people said their fathers had given them liberty and law. And I said: "This is the country I seek." As I traveled on I saw a great image, and it was overlaid with gold so that the foundations were rent, and I asked: "Whose image is this?" One of the inhabitants said: "This is that of Liberty and Law which our fathers gave us." Again I questioned him: "Why is it overlaid with gold and why did they mar its fair proportions?" And he said: "There are many who liked not the cold marble figure with its finely chiseled features and free flowing drapery; it was a too stern reality; so they covered this and hid that with gold until now it is a meaningless object." And I said: "Ah me! yet must I wonder for here"—

THE DISEASE.

Mammon sitteth in high places,
Truth and justice cast aside,
Honor set at naught; yea, sneered at,
Self, the motive, far and wide;
Self, the tyrant, crushing manhood
'Neath the worst of despots' feet,
Riding rough-shod o'er his brethren,
Self triumphant in the street;
Law and order only tinsel,
Freedom but a mocking sound,
Truth in shackles, virtue bartered,

Avarice reigns, and all are bound.
Gold, that speaketh every language,
Sways the law and buys the vote
That should be the nation's safeguard;
Gold, befouled, grips tight its throat.

* * * * *

And they are knaves who sell themselves
For wealth, or power, or place;
Nor are they free, they cannot be,
Who stoop to such disgrace.

THE CURE.

Let law be law with mercy tempered,
True liberty to all concede,
Knock off the shackles, gold has forged us;
To brother man a brother's deed.
Seek not to use a fallen fellow
As stepping-stone to self's own hight,
But grasp his hand and help him onward,
Be break of day, not gloom of night.

A nation's life is what we make it—
A narrow self, or selfish land;
Teach men good then can we take it
With love, from every brother's hand.
Evil will cease and man, triumphant
In all good deeds that's born of heaven,
Will nearer be to what God made him—
The people wait—Oh! for the leaven!

THE ALTERNATIVE.

Until that day the truest freedom
Lieth yet behind the veil,
While mammon steers the nation's guard-
ship

With lashed helm and tattered sail,
To a maelstrom dark with blood-drops,
Will she live it?—Will she fail?

George Beaumont Benford, Hydeville, Vt.

DRAWING FOR WORKMEN.—V*

BESIDES the scales already mentioned there are many others that are occasionally made use of by draftsmen, engineers and surveyors, but as most of them would prove of little use to the working student it will hardly be worth our while to describe them in these papers. There are some other instruments, however, that deserve a place in this series that are necessary to make up a fair working outfit.

There are several grades of instruments made, some of them having great merit and others being comparatively worthless. The greater portion of instruments sold in this country are imported and are known as the English, French, German and Swiss. There are instruments, however, of American make, known as Alteneder's. Their peculiarity is an adjustable pivot point, which is found of great service. These instruments deserve to be better known, and the makers more liberally patronized, as they are in many respects superior to most of the imported goods.

There are two qualities of Swiss instruments imported, the best, being the finest made, are generally for the most delicate work. The other qualities are good enough for general purposes and are low priced. French and German instruments are much lower in grade, cheaper in price, but cannot be relied upon to do good service. They are chiefly used in schools and by apprentices.

English instruments are all well made and more to be depended upon than most of the foregoing and they have a distinct character of their own; the compasses and dividers being furnished with what is called the "sector joint," which renders them reliable and safe to work with. They generally outlast any other make.

The distinction between the term "compasses" and "dividers," which are often indifferently applied to the same instrument, rests upon the fact that the true use of compasses is to describe arcs, circular curves, etc., while that of the dividers is to divide lines into equal parts. Whenever it is needful to lay off numerous arcs, or to measure without special accuracy being required, a pair of ordinary compasses is the proper instrument for the work, because compass legs can be separated and closed together in less time than is required for the shifting of dividers' legs.

The first instrument necessary for active work, is the compass. This is used for taking off and transferring measurements: it usually consists of two

*By Fred T. Hodgson, author of "The Steel Square and Its Uses," through the courtesy of *The Operative Builder* of New York.

legs, the upper half which is made of brass or German silver, and the lower half or points, of tempered steel. In the finest instruments the joints about which the legs move should be formed of the two different metals—German silver and steel—by this arrangement the wear is much diminished and greater uniformity and smoothness of motion is obtained. If this uniformity and smoothness be wanting, it is extremely difficult to set the legs quickly apart at a desired distance; for being opened and closed by the fingers of one hand, if the joint is not good, the legs will move by fits and starts, and either spread beyond or stop short of the point desired; but when they move evenly the pressure can be so applied to open the legs at once to the exact distance. The joint should be sufficiently tight to hold them in any position and not allow them to deviate from it in consequence



FIG 22.

of a small amount of pressure which is inseparable from their use. The joints of these compasses are tightened or loosened by inserting the two steel points of a key, that generally accompanies a box of instruments, two small holes being made in the head or joint to receive the pins spoken of.

The simplest of dividing compasses, is shown at Fig. 22. This has fixed legs and fine points. In order to transfer distances properly the instrument is to be held by the head or joint, the forefinger resting on the top of the joint, and the thumb and second finger on either side. When held in this way, there is no pressure except on the head and center, and the dimensions between the points cannot be altered; but, if the instrument be clumsily seized by the thumb on one leg, and two fingers on the other, the pressure, in the act of transference, must inevitably contract in some small degree the opening of the compasses; and if the dimension has to be pricked off several times, the probability is, that no two transfers will be exactly the same. And, while it is all important to keep the dimensions exact, it is also desirable to manipulate in such a way, when setting off the same dimensions a number of times, that the point of position be never lost. Persons unaccustomed to the use of compasses are very apt to turn them over and over and over in the same direction when laying down a number of measurements and this necessitates a frequent change of finger and thumb, which direct the movement of the instrument; the consequence is, either that the fixed leg is driven deep into the drawing, or it loses position. Now, if the movement be alternately above and below the line on which the distances are being pricked off, the compass can be worked with greater freedom and delicacy, and without any liability of shifting. If a straight line be drawn, and semi-circles be described alternately above and below the line, it will show the path of the traversing foot. If the two movements are tried, the

superiority of the one recommended will at once be discovered. The forefinger rests gently on the head; and the thumb and second finger, without changing from side, direct the movement for pricking off any number of times that may be required. Before applying the divider to the paper, they should be opened wider than the required distance; the point of the near leg is to be put gently down on the paper, the leg resting against the thumb, and the other leg gently brought to the required distance. The pressure is thus resisted by the thumb, and there is no risk of making a hole in the paper. These remarks apply to the use of compasses of all kinds.

There is another sort of dividers, named spring compasses, in which steadiness is combined with the delicacy of adjustment of the hair compasses. The last named are liable to error, in consequence of the weakness of the spring leg; and without very careful handling, the dimension, though taken with extreme exactness, cannot be laid down correctly. Now the spring compasses, of which we annex a cut, Fig. 23, have, from their principle of construction, a steadiness and firmness which cannot be surpassed. The legs are fixed to steel springs, whose elasticity keeps the points extended; the screw is fastened by a pivot joint and passes through a slot, and the opening of the instrument is adjusted by a nut working upon the fine thread of the screw. The legs are jointed below the screw, and the required dimensions can therefore be taken between the points nearly, and afterwards more accurately determined by a gentle turn of the nut. The instrument is worked by the forefinger and thumb on the head, and, in pricking off, the alternate motion before mentioned is to be observed. The cut gives the exact size of an instrument suitable for small dimensions; but the draftsman will provide himself with a variety of sizes, which will take in all the dimensions he may ordinarily require. And the advantage of having several of these instruments is, that dimensions that occur frequently in a drawing, can be left in one or more of them undisturbed; and thus much of the time saved that would otherwise be occupied in readjustment. When purchasing spring compasses, the young draftsman must select only those in which the screw works on a pivot, since, if it be fixed immovably it cannot adapt itself to the various extensions of the legs, and the fine thread is soon very much injured by the unequal pressure of the nut. Every case of instruments contains one or more pairs of compasses that have movable legs, which may be substituted by others carrying a pen or pencil. These instruments serve in the first instance as dividers, and the additional legs enable draftsmen to describe arcs and circles temporarily in pencil or permanently in ink. As it is an object to effect the change of leg with little

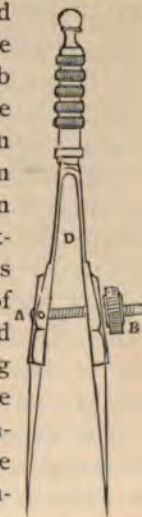


FIG. 23.

loss of time, some attention must be paid, when selecting instruments, to the contrivance for removing and securing the legs with dispatch. There are two methods of fastening the movable legs, one by set screws and one by what is known as the bayonet insertion. Of these methods the former is the better, though less quickly effected, since it is not liable to become loose or deranged after long use; though the slip or bayonet joint is more readily adjusted, and on that account is preferred by some first-class draftsmen. In working with the pencil and pen legs it is desirable to keep them vertical with the drawing; and, indeed, with the latter, it is absolutely necessary, as otherwise the arc or circle would be described with the side of the pen, and either it will not mark at all, or will produce a ragged, unsightly line. These legs are therefore jointed, so that, in proportion as the compasses are extended, they may be bent inward so as to assume a vertical position. But this adaptation unfits the instrument to describe arcs and circles of a very small radii, for the movable leg has usually a little additional length to compensate for the bending of the joint, and this prevents a steady adjustment when the points of the compasses are brought near together. In return for this restriction, however, we have a contrivance for describing arcs and circles of larger radii than fall within the usual range of the instrument. It is found, on trial, that if we attempt to describe an arc of more than certain radius with the pen leg, we require to throw the other leg into a very oblique position, with the almost certainty of losing its place, and making a false permanent line. To meet this difficulty, a brass lengthening bar is provided, which receives the pen leg in the one end and joins to the compasses at the other. When thus lengthened, the instrument will command a radius of eight or ten inches with ease and security.

The pencil leg consists of a tube which is sometimes split down the center to adjust itself to the size of the lead or point used. There are other dividers sometimes employed for holding a point but the one named is in our opinion by far the better way. Sometimes compasses are made when both legs are adjustable, and both arranged so that needle points may be inserted; others again are made so that the stationary leg is so devised that a needle can be inserted and held in place, while the other leg is arranged to take in a needle point, pen or pencil.

The leg arranged as an ink pen is formed of two blades of fine steel, terminating in thin, rounded, and well-adjusted points. The blades are so attached to the body that they require a small screw which passes through them, to hold them in position. In using this pen, the screw is slackened, and ink is inserted between the blades with a camel-hair pencil, and the blades are then brought together gradually by turning the little screw until they will produce a line of the desired quality. The draftsman will, of course, try the pen on a piece of waste paper before he ventures to make

use of it on his drawing. The compasses with movable legs have frequently to describe an entire circle, and an inexperienced hand finds some difficulty in carrying the traversing leg neatly round the circumference without the other leg losing position. Some persons have recommended the movement of the dividers; that is, to form half the circle in one direction, and half in a reverse direction; and this may answer very well with the pencil leg, but not with the pen leg, since it is almost impossible, in the latter case, to unite the two semi-circles without leaving marks of junction, which very much injure the continuity of the line that forms the circle. This being the case, it is preferable to adopt a method that shall answer equally well with either leg, and which, by one continued sweep, shall complete the figure. It is very desirable to use compasses for circles that have a due relation to the radii of the circles to be described; that is to say, such as will allow both the revolving and fixed leg to be nearly vertical to the paper, for if the fixed leg is inclined obliquely, it is apt to lose position, or to work a large unsightly hole in the drawing. When the compasses are so adjusted that both legs are vertical, or nearly so, it is at once a simple and elegant movement that carries the traversing point round the circle. Let the forefinger rest on the head, and the thumb and second finger on the sides; commencing the sweep at the top, and towards the right hand; the second finger becomes disengaged when a quadrant is described, and the forefinger then winds the head along the inner part of the thumb, until the point has performed the entire circuit. It is not always desirable to commence the circle at the top, but more frequently from a point which it is to touch accurately; this, however, presents no difficulty that the method does not meet. The only thing necessary is to place the fingers and instrument in position, in the first instance, with reference to the starting point; and this is readily done by a slight bending of the wrist. To one familiar with the use of instruments these instructions for manipulation may appear unnecessarily minute; but if he will place his compass for the first time in the hands of a youth, and observe his lack of intuitive dexterity, he will admit that they are in no degree too minute for a tyro.

[TO BE CONTINUED.]



MARY WASHINGTON'S MONUMENT.

CONSIDERABLE has been said in the press of the country recently regarding the erection of a monument to Mary, the mother of Washington, at Fredericksburg, Va. Few monuments projected will be more warmly commended than this, for few of the noted names with which the country is familiar are held in greater reverence by the mass of the people. Mary, the mother of Washington, is a name which arouses only the noblest emotions in the mind of every man or woman who possesses a spark of appreciation of noble womanhood.

In November, 1889, the ladies of Fredericksburg formed an association to raise funds to restore the old monument or build a new one as might seem best after thoroughly looking over the ground. Slowly, though none the less surely, the work has progressed, until the association now has about \$5,000, the ruins of the old monument, and more than five acres of ground. Two generous citizens of Fredericksburg presented the association with two lots and the third was bought by the association with the proceeds of a local appeal of an entertaining character.

The local association is now working in conjunction with the national Mary Washington Memorial Association organized somewhat later than the Fredericksburg association. A deed of the property of the local association has been given the national association conditioned upon the national association erecting, within a given time, "a suitable monument to Mary, the mother of Washington," and to erect said monument at Fredericksburg upon the spot selected by herself.

Mrs. James H. Thompson, the secretary of the local association, writes: "We shall spare no effort to secure an enduring monument as beautiful as art can make. The city of Fredericksburg will make it the center of a public square, with wide avenues of approach, that the American people may come and see that republics are not ungrateful. This will be a monument to a woman erected by women. We hope much from the Columbian exposition, where we expect to bring our association more prominently before the public."

It is not to be inferred from the above statement that men will be barred from assisting in the work, but simply that the management is to be in the hands of women. It is the worthiest monumental object now before the people and a liberal response will undoubtedly follow all appeals.

WELL PLEASED.

"Am well pleased with STONE. Don't stop sending it until notified to do so."—*H. A. Schweyer, King of Prussia, Pa.*

DEPOSITS OF BERYL.

SEVERAL varieties of precious stones of greater or less value are found in New Hampshire, but those which have attracted the most attention are the beryls, found in Acworth. This town has become famous all over the world, and many large and valuable specimens have been sold to go into cabinets in all parts of the world. There is one eight inches in diameter in the royal cabinet in Vienna, represented as coming from Acworth; and its description tallies with one reported to have been sold in New York for \$15,000.

Acworth is an exceedingly hilly and rocky town. Indeed, the only level spaces of any size are along the streams, and even there the levels are not very large. Mountains and hills form the distinguishing features of this landscape, and the physical conformation of the land is such that a traveler is almost bewildered at times. Beryl mountain is one of the most important of these hills, and rises abruptly from Cold River about one mile south of South Acworth village.

A drive up the Cold River valley and a visit to the now deserted quarries is a pleasant excursion for any time of year; but on a crisp September morning it is especially enjoyable. Almost as soon as one leaves the highway one comes upon the broken masses of broken rock, principally white quartz, which cover the ground between an old quarry and a piece of wood land. The general rock formation is white quartz, not the crystalline quartz commonly found, but the alabaster-like stone in which lies imbedded the common mica of New Hampshire. Among the debris are numerous blocks of beryl, blue, green, yellow, or a mixture of all. An excavation a few feet, perhaps twenty, in width and depth, has been made into the hillside for the quarrying of mica and beryl. The same white quartz prevails all through excepting at the entrance, where large masses of a beautifully tinted and shaded rose quartz forms the sides of the artificial cavity.

One is astonished at entering the cavern to find that one-half or more of the walls are made up of beryl of varying sizes. A larger proportion are at the farther end of the opening and are more or less overlaid by fifteen feet or more of quartz. One crystal is there exposed which must be nearly five feet long and from twelve to fourteen inches in diameter. Some of the beryls show the hexagonal form perfectly on cross section, but more do not.

The story is told that a crystal, perfect in form and color, four feet long and more than two feet in diameter was once taken from this quarry. The

apparent size and proportions of many exposed crystals leave no occasion for doubting the statement.

But Acworth is not the only town rich in beryls. About twenty towns yield crystals of greater or less size and value. The quarries in which such crystals are found are situated principally upon the highlands dividing the valleys of the Merrimack and Connecticut. The beryls themselves are generally found in veins of coarse granite rocks, so coarse that the pieces of mica are often several inches in length and breadth, and the masses of quartz and feldspar in proportion. This stone about Groton gives a peculiarly white color to the crests of the hills, making them look when the sun shines brightly upon them as though coated with masses of solidified snow. These peculiar veins yield stones which have frequently been cut into gems of great beauty and value, but it is noticeable that by far the finest specimens have been found loose in the soil at the base of the hills, or in depressions of the rock, where they have been deposited by the natural disintegration of the granite matrix. The extraction of perfect crystals from the granite is an operation attended with much difficulty. The adherence is so firm, and the gneiss so brittle, that it is only by the utmost care that a perfect specimen can be secured. The large crystals are always marred by rifts and the slightest jar will cause them to fly like glass. They are, therefore, always well hooped before an attempt is made to move them. The large crystals are useful for curiosities, merely, and it is only the smaller but more beautiful stones found in the same quarries that can be cut into gems for decorative purposes.

Groton has rich deposits of crystals, and Isinglass mountain has produced some large specimens. On Alger's hill, south of Isinglass mountain, and separated from it by a precipitous ravine, the largest crystals known in the world have been found. One hexagonal crystal from a quarry on its side weighed 2,900 pounds and was more than four feet long, with a diameter of nearly two feet. Another calculated to weigh 5,000 pounds was partially dug out, but was finally broken up by the men then engaged there, or fell to pieces by the action of the weather; it is uncertain which. Whatever the cause it is certainly to be regretted that the specimen was ruined.

On Fletcher mountain in Groton is an abandoned mica quarry in which many excellent specimens of beryls can be seen, most of them too heavy to be carried away. A careful examination of the quarries mentioned would more than likely result in the finding of many superior stones. The mica too, is valuable, so that there would seem to be a double incentive to work the now abandoned quarries which have heretofore yielded marvelous beryl crystals.

HIGHWAYS.

ALTHOUGH in the time of the Romans road-making had reached a high state of perfection, the art gradually died out, and towards the close of the last century the post roads throughout the country were little better than cart tracks. When these became almost impassable they were diverted, or a quantity of gravel or rough broken stone was dumped into them, the larger pieces being placed lowest, until they became in a measure passable. The first-class roads had the earth trenched out, and were built up solid, at great expense, out of boulders, gravel and other rubbish. At the beginning of this century, however, two great road builders appeared upon the scene, Macadam and Telford.

Macadam's plan of making roads differed as much from the old way which he found in operation, as a bridge does from a ford. Instead of going deep for a "bottoming," he worked solely on the top. Instead of producing a peaked, roof-like mass of rough, soft rubbish, he got a flat, smooth, and solid surface. In lieu of a road four and one-half feet through, he made one of, at most, ten inches in thickness; and for rocks and boulders he substituted stone broken small. His leading principle was that a road ought to be considered as an artificial flooring, so strong and even as to let the heaviest vehicle pass over it without impediment. Then people began to hear, with wonder, of roads thirty and forty feet wide, rising only three inches in the center, and he propounded the extraordinary heresy, that a better and more lasting road could be made over the naked surface of a morass, than over solid rock. Another of his easy first principles was that the native soil was more resistant when dry than when wet, and that, as in reality it had to carry not alone the traffic but the road also, it ought to be kept in a condition of great resistance; that the best way of keeping it dry was to put a covering over it that is impervious to rain—the road, in fact; and the thickness of this covering was to be regulated solely in relation to its imperviousness, and not at all to its bearing of weights, to which the native soil was quite equal. Instead of digging a trench, therefore, to do away with the surface of the native soil, he carefully respected it, and raised the road sufficiently above it to let the water run off. Impermeability he obtained by the practical discovery that stones broken small, and shaken and pressed together, as by the traffic on a road, rapidly settled down face to face, and angle with angle, and made as close a mass as a wall. Mankind now believe that this last is all that Macadam invented; the rest is forgotten. That im-

portant fraction of his discoveries is what has given to us the verb to macadamize, "to pave a road with small broken stones."

Surprise followed surprise. Roads which were mere layers of broken stones, six, four, and even as little as three inches in thickness, passed through the worst winters without breaking up, while, as a coachman used to say, they "ran true." Commissioners could not believe their eyes when they saw new roads made for much less than it had cost them yearly to repair the old ones. When an old road was given into Macadam's charge, he often made a new one of it for £88 a mile, while around London, the cost of annual repairs had been £470 a mile. For he knew that the roads—such had been the ignorant waste—generally contained materials enough in one yard for several yards, if properly applied. Unless the road was hopeless, he went to work in a practical, cheap way; first cutting out the "gridiron" of ruts in the center to a level with the bottom of the "furrows," then "picking" the road up to the depth of four inches, removing all chalk, clay or mud, breaking the largest stones small, and simply putting them back again, and one of his instructions to his workmen was that "nothing is to be laid on the clean stone, on pretense of binding." But too often the road was so bad, as at Egham, that it had to be removed to its foundations.

For repairs to his roads, when once made, he always chose wet weather, and "loosened the hardened surface with a pick," before putting on the first broken stone, things familiar enough to us now, but paradoxes then to all road makers. In this way he had the greatest success with the freestone, near Bath, and on a road out of Bristol, toward Old Down, where everybody had always said that a good road never could be made with the material available. This impossible road of eleven miles, which the postmaster general, as a last resource, was about to indict, he perfected in two months in 1816, for £55 a mile. Indeed, as to materials, they were to some extent a matter of indifference to him, provided they were stones only.

Even in the breaking of the stones, Macadam made a revolution. He saw that able-bodied men standing up with hammers wasted the greater portion of their strength. He made his stone-breakers sit, so that all the force of the blows took direct effect on the stone; and the result was that he found small hammers did the work perfectly well, and thus was able to confide it to old men past hard labor, and boys, which reduced the cost of the broken stone one-half. The size to which stone should be broken, he determined in a practical way, by the area of contact on an ordinary wheel with a smooth road. This he found to be about one and a half inch lengthwise, and therefore he laid it down that "a stone which exceeds an inch and a half in any of its dimensions is mischievous," that is to say, that the wheel in passing one end of it, tends to lift the other end out of the road; this maximum size is now increased to about two inches. In practice he found

it simplest to fix a weight of six ounces, and his surveyors carried about scales to test the largest stones in each heap. He would allow no large stones even for the foundation of his roads, for he found that they constantly worked upwards by the pressure and vibration of the traffic. The whole road was small broken stone, even over swampy ground.

Telford, who was well nicknamed the "Colossus of Rhodes," differed from Macadam, in believing that a road ought to have a built up, or hard substratum of large stones, concrete, or the like, and the experience of the most eminent road builders and city engineers at the present time have decided that for roads with large and heavy traffic, Telford was right. One point both engineers strongly insisted upon, that was that the road should be sufficiently arched in cross section to shed the rain, and no more, and that there should be a drain on both sides of the road. The best form of cross section, for general purposes, is found to be a circular arch having a fall of one in thirty, from the center to the side. A road should never be quite level longitudinally, or the water will stand in the gutters, instead of running off freely. Even, therefore, in perfectly level country, it is desirable to give the road a slight undulatory contour, the longitudinal slopes being about one in fifty. Besides the ditches, or longitudinal drains at the sides or under the footpath, if there be one, and the gutters draining into these at intervals, cross drains are frequently placed under the surface of the road, to carry off superfluous water. The early roads, too, had a border of turf between the road-bed and the ditch. This was useful for horsemen, and saved much expense in keeping roadsides and ditches clean, absorbing much of the solid matter, which would otherwise get into and choke the ditch.—*Discovery, London.*

TALC, AND ITS USES.

FIFTEEN years ago, or so, a deposit of singularly pure fibrous talc was discovered near Gouverneur, N. Y., and the paper makers of New England and Pennsylvania began to use it in place of sulphate of lime and clay as an adulterant for paper. The talc was found to have a strengthening effect by binding the fibers of the wood pulp together, and the use has increased until now nearly half of the good printing paper has talc, or something similar as a filling matter. In the cheaper grades powdered soapstone, an inferior quality of talc, is used, and large quantities of it are annually consumed in the process. The Gouverneur talc is the finest in the world, probably, combining the brilliancy of the North and South Carolina product, with the exceptional fibrous quality of the Virginia variety.

The town of Gouverneur is near the northwest edge of a geological island of granite, gneiss and limestone formations. Toward the west of the town, Potsdam sandstone abounds and Trenton limestone prevails on the southeast boarder. The talc deposit is in the townships of Edwards and Fowler, varying in distance from seven to fourteen miles from Gouverneur. Its length is about eight miles and its width one mile. The termination is abrupt at both extremities, and the local experts say that none is ever found except under surface outcroppings. That being true the deposit is limited to the above size, and the sudden and complete change of formation precludes all possibility of finding additional deposits. The veins of talc are nearly always separated by granite and gneiss, varying from thin layers to several inches in thickness.

Since 1879 ten distinct quarries have been opened, some reaching a depth of 400 feet on the slope. The cost of quarrying varies from sixty cents to \$1.25 a ton and the land owners collect from fifty cents to one dollar a ton royalty. The cost of transportation, from the quarries to the mills, over some of the worst roads in the United States, is about \$1.50 a ton, making the total cost of production at the mill \$2.35 to \$3.75 per ton. The average annual production is about 51,000 tons.

The reduction from the roughly quarried stone to the fine flour used in manufacturing, is not materially unlike flour milling in principle, though varying greatly in the appliances employed. It is first passed through a coarse, next a fine crusher and lastly through two pairs of buhr stones. It is then loaded into cars and from 800 to 1,600 pounds at a time put into an alsing cylinder six feet and one inch in diameter and from six to ten feet long. The cylinder is lined with porcelain brick and for one-third its volume filled with Greenland pebbles. For four hours, or less, maybe, the cylinder is revolved at the rate of twenty revolutions a minute, at the end of which time the talc is in the form of an impalpable white powder, somewhat resembling flour. A part of the talc, known as rensselaerite has hitherto been thrown away, the removal of the glistening particles being a too long and costly process, but the recent introduction of Cyclone pulverizers has made that easy, and the economy in power is very great.

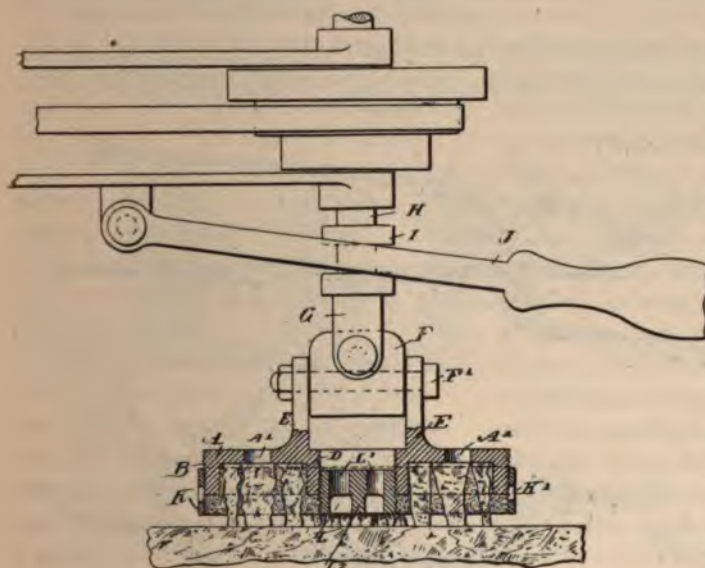


RECENT PATENTS.

POLISHING WHEEL.

Letters patent No. 481,415, issued to John McClellan, of Greenbush, N. Y., bearing date, August 23, 1892, relates to a new and useful improvement in polishing-wheels, of which the following is a description. The

Fig 1



object of the invention is to provide a new and improved polishing-wheel, which is simple and durable in construction, very effective in operation, and designed for conveniently polishing marble and other material when attached to any ordinary marble-polishing machine.

The invention consists of an inverted revoluble cup, adapted to contain the grinding or polishing material, and a ring held adjustably on the rim of the said cup to hold the polishing material in

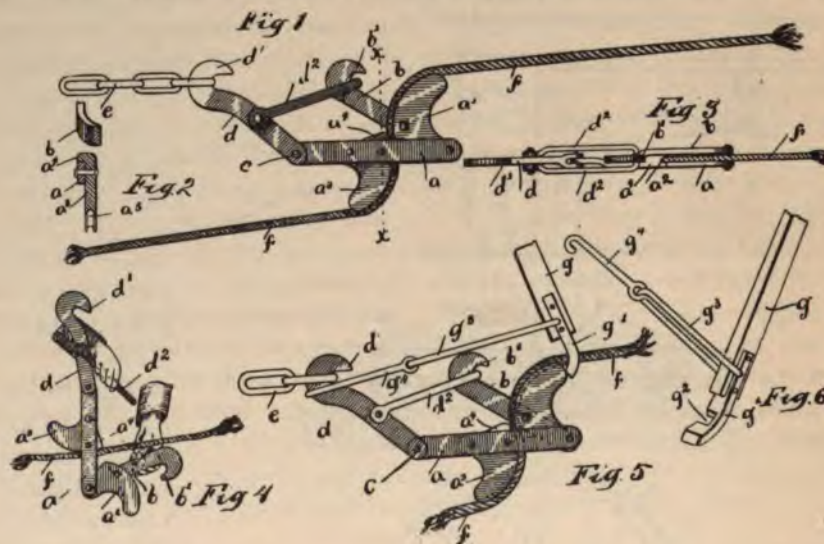
place and to prevent the cup from striking the marble. The invention also consists of certain parts and details and combinations of the same, pointed out in the claims. Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

Figure 1 is a sectional side elevation of the improvement as applied, and Fig. 2 is an inverted plan view of the same.

ROPE CLUTCH.

Letters patent No. 478,839, issued to Harwell L. Bennett and Russell B. Adams of Westerville, O. bearing date, July 12, 1892, relates to that class of rope-clutches which are particularly designed to form a lever connection between a power-windlass rope and a chain for pulling stumps or moving heavy bodies.

The objects of the invention are to provide a simple and reliable device of this class of great strength and durability and of such construction as to



admit of a rope being firmly grasped and held thereby, to so construct said device as to provide for an increase in the binding action of the clutch in proportion to the increase of strain on the rope, to admit of the connection of the clutch with a loose or tight rope, to so construct the device as to prevent injury to the fiber of the rope, to so construct the device as to admit of one or more objects being pulled upon by the same windlass-rope, and to produce other improvements, which may be more specifically pointed out

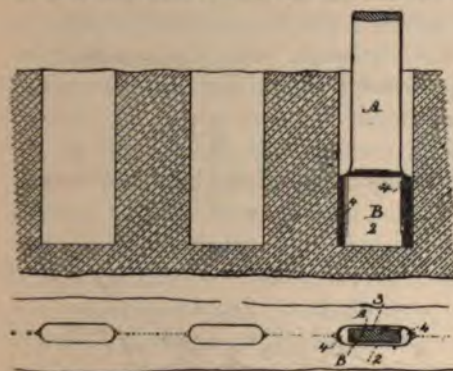
hereinafter. These objects are accomplished in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of the improved clutch, showing a portion of a winding rope and power-chain in connection therewith. Fig. 2 is a vertical section on line *x x* of Fig. 1. Fig. 3 is a plan view. Fig. 4 is a view in elevation showing the parts in position for connecting with the rope. Fig. 5 is a view in elevation showing in connection therewith means for releasing the rope from engagement with the clutch, and Fig. 6 is a detail view in perspective of the releasing device employed.

ROCK DRILLING AND SPLITTING.

Letters patent No. 486,101, issued to George M. Githens, Brooklyn, N. Y., relates to rock drilling and splitting.

The drill has a shank and a head that is comparatively thin, with flat sides and rounded ends, whereby the hole as drilled is much longer in one



direction than the other and has flat or nearly-flat sides and round ends. The method of drilling and splitting rock, consists in drilling into the rock a range of holes, each hole being much wider in the line of cleavage than in the opposite direction with flat sides and rounded ends, and introducing powder and exploding the same, so that it may act between the nearly-flat opposite surfaces to pry the stone apart in

the line of cleavage and in a plane passing through the longest diameter of the holes, whereby false cracks and injury to the surface of the stone are avoided.

OLD, BUT GOOD.

THE "staff" which is so important in the architectural decorations of the world's fair buildings is an inferior quality of scagliola, a material used by the ancient Greeks and Romans and later during the Italian Renaissance. When carefully prepared and polished scagliola makes a handsome and enduring finish for interiors. It is simply a sort of artificial stone prepared from gypsum, a very cheap substitute for marble.

RAILWAY QUESTION IN INDIAN NATIVE STATES.

THE various native administrations in India have not hitherto shown any great energy in constructing railways within their territories. But within the last few years several princes of the first rank have manifested a desire in this direction, and to prove by so doing that they are anxious to place their subjects in as favorable a position for purposes of trade as if they lived in British India. In order, however, to carry out this purpose it was necessary to come to an agreement upon certain principles between the supreme government at Calcutta and the feudatory states, and, unfortunately, these principles have not been found so easy of discovery and agreement as was at first thought possible. There is no doubt that both sides are actuated by a sincere desire to do what is right, but the regrettable fact remains that there is a divergence of view between the government of India and some of the most important native states on the question of introducing railways into their portion of the peninsula subject to the feudatory princes. Last spring the Calcutta government sent a circular letter on the subject of railways in the native states to its agents and residents at the courts of the different princes, and it laid down therein two principles which have not found ready acceptance, and which have even excited considerable opposition. Those principles are that, whenever any portion of the projected railway passes through British territory, the jurisdiction over the whole of the railway and its employes shall be ceded to the British government; and, secondly, that the control of the line shall be surrendered whenever the government of India may demand it. To both of these principles some of the chief native states have taken decided exception. With regard to the former, it is said, and the force of the agreement is apparent, that in many cases where a state consists of detached fragments, like Baroda, for instance, it would mean that the chief who gave his treasure and influence for the construction of a railway would see his authority curtailed as the immediate consequence of its being constructed. With regard to the latter principle native ministers contend that the government of India should define beforehand the circumstances under which it would require the ruling princes to surrender control of their railways, and not leave this important point vague and indefinite. It is gratifying to learn that in every case the native states have expressed their willingness to place their railways under the control of the government of India in the event of foreign invasion, but there is reason to fear that, unless the supreme government meet the native governments in a friendly and conciliatory spirit, a long time must elapse before many such railways come into existence.—*European Mail.*

COMMERCE OF THE GREAT LAKES.

AT the fifth annual meeting of the International Congress on Inland Navigation at Paris this year, Hon. George H. Ely of Cleveland, O., delegate from the American Society of Civil Engineers, presented a report upon the Great Lakes of North America. The report was exhaustive and scholarly and contained valuable commercial statistics. A brief extract of the report is given here.

He called attention to the fact that 150 miles northwest of Duluth physical conformations of the earth's surface caused the waters coming from the mountains to flow in three different directions, giving rise to three of the great drainage systems of the continent. The waters flow northward to the ocean through Hudson's bay, southward through the Mississippi valley and the gulf of Mexico, eastward through the lakes and the St. Lawrence. For commercial purposes the northern drainage system has not yet been utilized, but flowing water will forever be a potent instrument of commerce southward and eastward between the interior and the Atlantic coast.

The United States originates the larger proportion of the tonnage of these lakes. This is due, largely, to the fact that the advantages in respect to climate and population are nearly all on the side of this country. Eight of the largest, most fertile, most wealthy and most populous states border on these lakes, and beyond the head of Lake Superior lie 600,000 miles of fertile American territory tributary to this. Another like imperial region lies to the northward, British possessions, as yet untouched, containing nearly 10,000 square miles and capable of limitless cereal production, and all tributary to these waters. Lake commerce is yet in its infancy.

Lake Superior, the greatest of all fresh water seas, was unknown and unexplored, long after the territory bordering upon other lakes of the system was well populated. It lay in distant isolation, infolded by a wilderness, the coming civilization heralded only by the missionary and the fur trader coasting along its silent shores. Its mineral treasures first drew the explorer up the St. Mary's river. How faint then conception of the commerce destined to pass through that channel! The descent in the St. Mary's river, 74 miles long, is 20 feet 4 inches; 18 feet 2 inches of this is at the Sault. Two feet two inches are distributed over the first 35 miles below the Sault. Lake Superior was opened by the completion of the canal and first lock in 1855. This passed vessels drawing a maximum of $11\frac{1}{2}$ feet of water. This was superseded in 1881 by a lock now in use, 515 feet long, 70 feet wide

and 17 feet of water on the mitre sill. From that time this lock has with wonderful efficiency met the demands of a rapidly increasing tonnage. In 1882 it passed 2,029,000 tons; in 1883, 2,267,000 tons; in 1884, 2,874,000 tons; in 1885, 3,256,000 tons; in 1886, 4,527,000 tons; in 1887, 5,494,000 tons; in 1888, 6,932,000 tons; in 1889, 7,516,000 tons; in 1890, 9,041,213 tons. The average season of navigation in that latitude is about 220 days. The total number of passengers in 1890 was 10,557. The average number passing per day was 45.3. The average registered tonnage per vessel in 1887 was 626.3; in 1891 it was 862.1. The annual average net tonnage for the last five years of the Suez Canal, a world's channel of commerce and open every day of the year, was 6,983,167 tons. The annual average net tonnage of the lock and canal at Sault Ste Marie for the same period, open only an average of 220 days in the year, was 6,821,062 tons. In 1886 appropriations were begun for the third lock, to be placed alongside of the lock now in use, and on the site of the original lock of 1855. This work now under construction by General O. M. Poe, to be completed in 1896, at a cost of \$4,988,865, is 800 feet long, 100 feet wide, and 21 feet on the sill. The completion at an earlier date of the Hay Lake channel, a supplementary work in the St. Mary's river below the lock, at a cost of \$2,659,000, insures 20 feet of navigable water through the St. Mary's river to Lake Huron and a saving in distance of 11 miles. Twenty feet of water here, however, means, and was always intended to mean, 20 feet through every other channel on the lakes between Chicago and Duluth and Buffalo.

To carry out this comprehensive plan congress has begun appropriations to defray expenses of removing obstructions at six different localities along the line. The estimate of the sum required for the completion of the work aggregate \$3,394,835, and twenty feet of water will be secured at each of these localities contemporaneously with the completion of the works at the Sault in 1896.

The registered American tonnage of the lakes on June 30, 1891, was 1,154,870 tons, 1,592 steam vessels, representing 736,751 tons, 2,890 sailing vessels, representing 418,119 tons. The tonnage has more than doubled in the last five years, the increase being almost exclusively in steel steamships of 1,500 to 2,500 tons register. The shipbuilding plants of the port of Cleveland alone launched 71,322 registered tons in the year 1889-90. As a shipbuilding locality Cleveland has already become second only to the Clyde. During the fiscal year ending June 30, 1892, 64 vessels, representing 83,223 tons, mainly steel steamships, have been added to the lake fleet at a cost of \$7,911,000. Of the total United States tonnage launched in 1889 46 per cent. was on the great lakes, 41 per cent. on the Atlantic coast, 8 per cent. on the Pacific coast, and 5 per cent. on the western rivers. Of the total tonnage moving through the Sault canal 90 per cent. is made up of five

commodities: wheat, corn, iron ore, coal, and lumber. These it will be observed, are all primary products, whose bulk and weight are large in comparison with value. They went to market in 1891—\$100,000,000—on the average draft of water that year at the Sault lock of 14 feet 8 inchss, an average distance of 800 miles, at a cost of one mill and three-tenths per ton per mile.

TRANSPORTATION AND COMMERCE.

IN the interchange of products lies the prosperity of a nation. In this matter transportation is an important factor, and this is unfailingly in correspondence with the areas included in the circle of commerce. As these are large or small, the rates of facilities of transportation rise or fall in their potentials. As methods differ or improve the status of prosperity varies. In the matter of inland commerce it is as important as trade debouching from seaports and shore lines. Competition is by no means international, and it is simply a fraud on public faith to say so, and inland rates on the transportation of products or merchandise are as operative for good or evil as are any treaties or law defining the interchange of international commodities. Obtusity on this point is explanatory of some of the fat mortgages and lean gaugers of the nation.

The inland transportation of the United States is perhaps the most comprehensive and serviceable system of modern times. In areas transversed, the average speed of transit, in capital invested, and in skill and efficiency of management, we are as a country or nation, in a diversity of products and climate, a unit, to which no contemporaneous nation supplies a duplicate. From north to south and east to west, in waterways and railroads, we include in our transportation a series of products that in volume and variety are unparalleled. In response to this we have developed a railway system that has networked a continent. This has graduated from crude and original conditions, and step by step resolved itself into a series of organizations. In each of these the commercial forces of the age have focused rival commercial cities, rival agricultural, manufacturing and mining industries, and rival commercial establishments, each and all of which are struggling for advantages in the markets. In this conflict every available means of securing traffic has been devised and appropriated, and the transportation drummer, in whom the competition in rates and service are represented, has become as ubiquitous and indispensable as the locomotive and railway agent. This condition is by no means abnormal; it is simply consequent. Companies have the right to live. If they bankrupt, everybody has a stone to throw at a delinquent debtor. If dividends add to the waistband of stockholders, we

simply re-enact the rock-throwing or change the direction of the fork from our personal potato to corporation mutton.

For all of this we are, as a nation, discovering the fact that the commercial forces of the country are finally potential in the matter of transport charges. It is, in fact, more to this cause than to unreasonable and sometimes demagogic clamor and equally precipitate legislation, that the schedule of rates has been on a search for zero, and in some cases has dropped into an arctic crack. There is yet, however, a sufficient amount of misunderstanding on the matter of transport charges that is easily accessible to diplomatic and demagogical designs, to insist on some reformation in present methods by which a legitimate and indispensable business should be secure, both from political bandits and from autocratic and greed-inspired organizations. The whole matter is of vital import, and the forces interested, both commercial and political, have an enormous pressure on their respective lines, and the wholesome control or restraint of either is imperative. We have entered on an age of centralization, in which to escape the economics that are forcing working expenses up one tube and income down the other, the concentration of management has become a necessity. It is not likely to gravitate to a unit, though its approximation in that direction has so far been rapid. The eventuality in this instance is not to be forecast, except on the lines of precedent, in which the intelligence and sound judgment of the nation will be equal to its duty. The transportation interests of the country are of too numerous and far-reaching a character to be made a game of bagatelle, and in its adjustment to new conditions will not fail in the usual result of making two and two a four.—*St. Louis Lumberman*.

THE GULF STREAM.

THE currents of the ocean are the great transporters of the sun's heat from the torrid zone to temper the climate of the polar regions. It is argued by some that such a stupendous change as that which occurred in Europe and America at the glacial period was simply a deflection in the currents in the northern hemisphere, whereby its share of tropical heat was partly diverted toward the South. In the three great oceans—the Atlantic, the Pacific and the Indian—there is to be found a similar circulation—a general westerly movement in the tropics, a flow toward the poles along the eastern shores of the continents, an easterly set in the temperate zones, and a current towards the equator along the western shores. This system thus becomes a grand circular movement, some parts being very slow but still constant, and other parts very swift. There are offshoots here and there, due to local causes, and perhaps in the slowly moving current

there may be a temporary interruption, but, taken as a whole, the movement is continuous. The part of this circulation flowing along the eastern coast of the United States is the greatest of all these currents, and, in fact, is the most magnificent of all nature's wonders. This is the Gulf stream. The Gulf stream was first suggested by Benjamin Franklin because it comes from the Gulf of Mexico. While it is a portion of the grand scheme of ocean circulation, and the Gulf of Mexico is in reality only a stopping place, as it were, for its waters, the name is generally applied to the current when it reaches the Straits of Florida, north of Cuba. In the large funnel-shaped opening toward the Gulf of Mexico, the current at first is variable in direction and velocity, but by the time Havana is reached it has become a regular and steady flow. As it rounds the curve of the Florida shore the straits contract, and the water then practically fills the bank from shore to shore, and reaches almost to the bottom, which is at this point about 3,000 feet deep. As it leaves the Straits of Florida its course is about north, but it gradually changes its direction, following approximately the curve of 100 fathoms deep until it reaches Cape Hatteras. From this point it starts on its course to Europe. It has lost something in velocity as well as temperature, and as it journeys to the eastward it gradually diminishes in both until it becomes a gentle flow as it approaches Europe. People think the Mississippi river a grand stream, and it is so in truth, so far as large rivers go, but, great as it is, it would require 2,000 such rivers to make one Gulf stream. The great ocean river is an irresistible flood of water, running all the time, winter and summer, and year after year. It is as difficult for the mind to grasp its immensity as it is to realize the distance of the nearest stars. At its narrowest part, in the Straits of Florida, it is thirty-nine miles wide, has an average depth of 2,000 feet, and a velocity at its axis—the point of fastest flow—of from three to more than five miles per hour. To say that the volume, in one hour's flow past Cape Florida, is ninety billions tons in weight, does not convey much to the mind. If we could evaporate this hour's flow of water and distribute the remaining salt to the inhabitants of the United States, every man, woman and child would receive nearly sixty pounds. It is curious to note in the history of the Gulf stream how great its influence has been in the history of the New World. Before the discovery of America strange woods and fruits were frequently found on the shores of Europe and off-lying islands. Some of these were seen and examined by Columbus, and to his thoughtful mind they were confirming evidence of the fact that strange lands were not far to the westward. These woods were carried by the Gulf stream and prevailing winds from the American continent, so in part the Gulf stream is responsible for the discovery of the new world. Ponce de Leon, while on his famous search for the fountain of youth, made the discovery of this practically beneficial phenomenon. The whalers of

New England were the first to gain a fairly accurate knowledge of the limits of the currents between America and Europe by following the haunts of the whales, which were found north of one line and south of another, but never between the two. This they reasoned was the Gulf stream current. Benjamin Franklin received this information from the whalers and published it on a chart for the benefit of the mail packets plying between England and the colonies. The chart was issued about 1770, but was not accepted by the English captains. Before it came to be generally known and used the trouble between England and the colonies began, and Franklin, knowing what advantage the knowledge would be to the British naval officers, suppressed it all he could until hostilities ceased.

NORCROSS BROTHERS' BIG STONE.

NORCROSS BROTHERS, contractors and builders, of Worcester, Mass., have recently quarried, from their Branford red granite quarry, at Stony Creek, Conn., a stone to make a finished shaft forty-one feet, six inches long and six feet in diameter. The stone weighs 100 tons as shown in illustration. It is to be used in the West Point, N. Y. battle monument. The stone is a fine specimen of the Branford granite and when



STONE FOR SHAFT WEST POINT MONUMENT—NORCROSS BRO.'S QUARRY, STONY CREEK, CONN.

the shaft is completed it will be a stone worthy the reputation of the firm preparing it.

The illustration shows the stone as it laid in the quarry at Stony Creek, after being separated from the parent ledge, and also gives some idea of the Messrs. Norcross' quarrying industry there.

WHITE LIMESTONE.

ONE of the most interesting geological features in the state of New Jersey is the white crystalline limestone formation in the northern part of Sussex county. In addition to its interest from a geological point of view, it is a beautiful and most valuable rock. It not only makes the finest quality of lime when calcined, but it has been demonstrated that it is a sound and beautiful building stone. Although the general tone of the stone is almost as white as pure marble, there is enough foreign matter in it to relieve the staring whiteness and give the structure a gray cast. It glistens in the sunlight with beautiful effect, the millions of facets made by the natural planes of the fractured crystals giving out flashes like so many gems. Intimately mixed with the calcite are fine flecks of graphite, or plumbago, which temper the glaring whiteness of the stone.

The State Geological Report says of this material: "The white limestone belt begins at Mounts Adam and Eve, in Orange county, N. Y., about four miles northwest of Warwick. A narrow tongue lies along the southwest flank of Mount Eve, and another tongue lies between the hills. From this point south the belt widens until at Amity it attains a width of two miles. From Amity the belt again narrows as it approaches the New Jersey line. Near the line the limestone lies against the eastern foot of Pochuck mountain, and continues to a point about a mile and a half below the village of McAfee, in Sussex county. At McAfee the white limestone seems to fill the entire valley between the Pochuck and Hamburg mountains, crossing the valley at nearly right angles. From here it follows the foot of Hamburg mountain to Franklin Furnace, where the belt again crosses the valley and thence follows the eastern foot of the Pimple hills to a point a little below the zinc mines at Sterling Hill. From the northern limit to Sterling Hill, a distance of thirty-one miles, the belt of limestone appears to be continuous, but from this point to the Delaware river the line is indicated by isolated patches of limited area. Between the terminus of the line at Sterling Hill and the Sussex railroad, still further south, there are from eighteen to twenty-five outcrops, varying in extent from a fourth of an acre to ten acres. The next largest outcrop is along the eastern foot of Jenny Jump mountain, in Warren county. The line there is broken up into seven or more patches within a distance of five miles. The largest patch is at Southton, at the extreme northeast point of the mountain. It was at Jenny Jump that the

famous rose marble was quarried some years ago. This was a beautifully tinted variety of the crystalline limestone, and small pockets have been found of similarly tinted stone in several localities since, and have been quickly used up if within easy access of a freighting station.

A very limited outcrop is exposed in the Delaware, Lackawanna & Western railroad cut at Pequest Furnace. The last exposure lies in a narrow valley about two miles in length, and running nearly east and west, between the Belvidere mines, northwest of Oxford, and Hazen Post Office. Beginning at Mounts Adam and Eve, it will be noticed that the white limestone is flanked on either side by the blue or magnesian limestone. On the northwest border the blue limestone is cut out near the New Jersey line by the Pochuck mountain on one side and the white limestone on the other. On the southeast side the blue limestone follows along the border of the white, till it is cut out by the white limestone on the eastern slope of a small, precipitous hill, one-fourth of a mile directly east of the hotel at McAfee. Between Mounts Adam and Eve and McAfee there are several places where the unchanged blue and the full crystalline white limestone lie close together or grade into each other. From McAfee to Franklin Furnace the blue limestone lies on the northwest flank of the white till it ends at Franklin Furnace, on the northeast point of the Pimple hills.

The other rocks associated with the white limestone are granite, scapolite, gneiss, sandstones and quartzites. The granite is by far the most abundant of the foreign rocks of the limestone system, and in some cases is found in great dykes cutting through it. The white limerock is supposed to be blue limestone changed to crystalline form by heat and pressure. It is rich in minerals and prolific in interesting specimens of great value in the eyes of collectors. The great zinc mines, which have no counterpart on earth, lie in the white limestone folds, and rich iron mines exist in the same territory. Among the zinc mines the limestone has revealed over a score of beautiful minerals, some of which are unique. Then scattered through the white limestone district have been found rare and valuable gems, such as the famous spinel ruby, tourmalines, garnets, rhodonite and other gems.

If the white limestone comes into general use as a building stone, it will open up a great business for several existing quarries whose product is now burned for whitewash material."



CONVENTION CALLS.

NEW ENGLAND MARBLE DEALERS.

THE Retail and Wholesale Marble Dealers' Association of New England and the Provinces meets in Boston, Mass., January 25, 1893.

The annual meeting of our association will be held in Boston, Mass., Wednesday, January 25, 1893, when the election of officers will occur and other important business will be considered.

The following committee of arrangements, selected at the semi-annual meeting, last July, will have charge:

Walter E. Pierce. John Kelley, John J. Love, James F. Brennan. Seward W. Jones, Frank H. Torey, Henry Cavanaugh.

JAMES F. BRENNAN, Secretary.

WM. G. GARMON, President.

THE OHIO VALLEY ASSOCIATION.

THE Ohio Valley Association will meet at Indianapolis this year. The call for the meeting is given herewith.

SECRETARY'S OFFICE
BLOOMINGTON, IND., December 20, 1892. }

To Stone Contractors and Quarrymen:—

The regular annual meeting of the Ohio Valley Cut Stone Contractors' and Quarrymen's Association will be held in Indianapolis, Tuesday, January 24, 1893, beginning at 10 o'clock a. m.

A program will be prepared and mailed later, which will give full particulars of special matters to come up for consideration at the meeting, and we feel safe in saying that it will contain subjects of interest to all stone dealers and producers.

We extend to all contractors and quarrymen, who are not members of this association, and to others who may receive this notice, a cordial invitation to meet with us.

Our organization should include every stone contractor and quarryman in the Ohio

valley. We would, therefore, urge the members to bring with them applications for membership from their neighboring competitors.

The Denison hotel has offered us the use of its parlors for the meeting and has made a special rate for this occasion of \$2.50 and \$3.00 per day.

B. A. McGEE, Secretary.

JAS. H. PETER, President.

INDIANA MARBLE AND GRANITE DEALERS' ASSOCIATION.

JANUARY 13, 1893, is the date set for the Indiana Association and Indianapolis is the meeting place.

The regular annual meeting of the Indiana Marble and Granite Dealers' Association will be held in Indianapolis, Friday, January 13, 1893.

The new Spencer House, opposite the Union Railway station, has been selected as the place of meeting, and as the best hotel for the money in the city. It is customary for many of the dealers of the state to stop there while in the city.

Some surprise may be experienced by members over the selection of the date for this meeting, especially from those with a taint of superstition in them, but your secretary considered the fact that, this being the Columbian year, and that America was really discovered on Friday, the 13th, there was the promise of fair weather and good luck in appointing this day and date for the meeting, in the hope that this association might be "discovered" by Indiana dealers. A further reason lies in the fact that other state associations have appointed their days in the preceding week, and that possibly some of the attendants at those meetings might wish to take in our meeting following. He hopes these conclusions may stand good and reasonable with our people; and that dealers will unanimously respond to the cordial invitation to come out and make this meeting successful in numbers, and in the interest and enthusiasm which a wholesome personal respect for each other always brings about. The legislature of the state will be in session, and it will be an opportune time for dealers to move in force upon that body for anything they want—excepting an appropriation.

We met one year ago without any prepared program, and the result was the most entertaining and business-like session ever held. The experience may be repeated at the forthcoming meeting. Cut and dried programs are always tangled webs. Better that dealers come without grievances, without premeditated purpose to "roast" their brethren in the association's fire—which should be for the warming and stimulation of a broader fellowship, rather than to scorch and blister the reputations of dealers whose conduct may not always measure up to the standard set by other men. Let it be for the refining of the evils that prevail in the trade, through the glowing warmth of sympathy for those who are having a hard struggle to get along, and whose helplessness tempts to wrongdoing. Give such men the hand of friendship, and say to them, as the Master said: "Come, and abide with us, and we will do ye good."

D. H. RANCK, Secretary.

JOHN OHAYER, President.

MICHIGAN ASSOCIATION.

THE Michigan Association will meet at Kalamazoo, Wednesday and Thursday, January 4 and 5. A number of important subjects will come up for discussion and a full attendance will be appreciated.

The third annual meeting of the Michigan Marble and Granite Dealers' Association will be held at the American House, Kalamazoo, Mich., on Wednesday and Thursday,

January 4th and 5th, 1893. The meeting of the national association having been called for January 11th, it was thought best to call the Michigan association meeting one week earlier than the date set at the Jackson meeting, so delegates could be appointed to attend the national meeting. According to the provisions of the constitution of the national association, our association is entitled to three delegates to the national meeting.

At the Kalamazoo meeting, officers for the ensuing year will be elected and other business of importance will be transacted. Steps will be taken to secure the passage of a lien law for the better protection of dealers engaged in furnishing cemetery work. This matter is one of vital importance to all dealers in the state, and it should be the duty of non-members, as well as members, to attend this meeting and do all possible to aid in securing a passage of this law. A cordial welcome will be extended if you are not a member, and we want to see *you* at our meeting. It has been the aim of the association to supply all dealers with a copy of our constitution and by-laws, so the objects of the association may be fully understood, but should there be any who have failed to receive one, a copy will be mailed to them on application to the secretary at Lansing.

Kalamazoo as a place of meeting offers many attractions. It is very accessible from all parts of the state, and especially to those residing in the southern and western parts. Arrangements will be made to give dealers attending an opportunity to visit the asylum for the insane and other points of interest in the city.

It is expected that this will be an unusually interesting meeting, and we hope that an extra effort will be made on the part of all engaged in the marble and granite business to attend. Don't forget the date, Wednesday and Thursday, January 4 and 5, 1893. The first session will be called to order at 1:30 p. m., Wednesday, January 4,

C. H. HARRIS, Secretary.

Lansing, Mich.

PHILO TRUESDELL, President,

Port Huron, Mich.

NATIONAL DEALERS' ASSOCIATION.

THE National Marble and Granite Dealers' and Manufacturers' Association of the United States and Canada will meet at Cleveland, January 11, 1893. The secretary's notification, given herewith, outlines some important topics for consideration.

GENERAL CALL OF THE NATIONAL MARBLE AND GRANITE DEALERS' AND MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA AND CANADA.

To all Associations now members of this National association and to all other associations of marble and granite dealers and manufacturers, greeting.

Gentlemen :—

I hereby issue a call for a meeting of the National Marble and Granite Dealers and Manufacturers of the United States of America and Canada, to be held at Cleveland, O., at the American Hotel, on Wednesday, January 11, 1893, to convene at the hour of 10 o'clock a. m.

Having an earnest desire that whatever may be done, shall be for the best interest of all concerned, it is hoped that all associations, whether state or local, shall be fully represented.

The needs of every section of our country differ materially in some particular from those of every other section, and it is necessary that every association be represented so that our legislation may not work to the detriment of some, while it benefits others.

"In a multitude of counselors there is wisdom," and when that wisdom is the outgrowth of experience it cannot but result in good to all interested. Some of our state

and local associations have been organized for years, and this has been an experience showing forth the needs of the particular sections within their jurisdiction, and, also, what is still necessary to be done to enhance the interests of the members of these special associations. Through this experience others may receive suggestions of great practical value.

Organization is now the watchword of success; and every business sought to be conducted without its aid is stamped as guess work, and sooner or later proves a failure. Through the means of associations our acquaintance is extended; a comparison of views, opinions and methods show each other how to meet many of the requirements of trade, and the result is highly beneficial. A conservative principle permeates and controls our associated efforts, which, if continued, will eventually enhance our financial interests beyond present anticipation.

In this meeting there will be questions of national and local importance brought up for discussion and action, and every section should have its representative present to care for its special interests so that in the future it will not be necessary to undo what has been done in the past.

The time has now arrived when the plan of organization should be fully matured and completed, and all should know and understand it and assist to keep it in good working condition. It may be that at first we do not meet all the needs of our vastly growing trade in all sections, yet, by wise counsel and judicious action our future, through knowledge gained, can be provided for, and our efforts eventually result in the greatest possible good for all.

Again requesting all associations of marble and granite dealers, whether state or local (and whether members of the national association or not,) to send delegates in accordance with the provisions of our constitution, which is, one delegate for every twenty, or fraction of twenty, of their membership, and they may rest assured of a royal welcome, and their coming together prove that the most hopeful and good results will be obtained.

I. H. KELLEY, Secretary.

JAMES HARSHA, President.

THE OHIO ASSOCIATION.

THE Ohio State Association meets at Columbus, Wednesday, January 18, 1893, to consider the matters set forth in the secretary's notice.

SPRINGFIELD, O., Nov. 15, 1892.

To the members of the Marble and Granite Dealers' Association of Ohio, greeting.

Gentlemen:—

The date is drawing near for the next semi-annual meeting which is to be held in Columbus, O., on Wednesday, January 18, 1893. Since our last meeting nothing of importance has occurred to demand special attention or call forth special remark, unless it be the general apathy of our members in the interest of associations and the lack of interest in the trade by dealers generally.

There can be but little question that this state of affairs has been occasioned by the dullness of trade, incident to the great granite strike inaugurated in May last. The major portion of those engaged in the granite trade could easily foresee that the obtaining of stock to fill orders during this difficulty would be a matter of no little moment, and hence, all effort to effect sales, was, for the time being, almost wholly suspended. To-day the trade feels the effect of this suspension; and to promote a renewal of business now requires all the energies any dealer is able to command. And the wholesale dealer,

although he may be pushed to the utmost to fill present orders, now looks back on the months of enforced idleness, and is ready to exclaim with *Puck*: "What fools these mortals be." The many, many dollars lost to the trade and the country will never be known, but the loss is and will, for many a day to come, be severely felt in all the channels of trade in the granite producing and granite selling districts. It is to be hoped that the lesson learned will be of value in the future; and that some other way will be found for settling the difficulties, so that those who depend upon the using of their good, strong arms for a living will not be compelled to let hungry mouths go unsatisfied, or accept the gifts of limited charity to gratify the whims and caprices of a leading few. Such errors as this is the death of associated effort, and never, until reason can take the place of rash impulse, will associations fill their manifest duty.

We again desire to invite the dealers in marble and granite of this state to come together in convention at Columbus, O., on the third Wednesday, January 18, 1893. "Come and let us reason together," and see if we cannot aid our own interests by advancing the interests of the trade in general. The meeting will assemble at 10 o'clock, a. m. with headquarters at the American hotel.

Every member of the association should feel that he is in duty bound to be present, prepared to say or do something which will at least benefit himself, if he cannot benefit everybody else. Important questions will be brought up for discussion, and let all be ready to "show a reason for the faith that is in them."

Reports of the several investigating committees should be ready for presentation, and they will, no doubt, prove of decided interest. It is also expected that a full report of the national convention, which convenes at Cleveland, O., January 11, 1893, will be presented.

We desire to urge upon any and all dealers who are not members of the Ohio association, the importance of a visit to the meeting now called. Your interests may be wonderfully affected by the course of action to be followed and it behooves all to be present and to know what is proposed to be done. A cordial welcome will greet anyone whether they become members or not. By order of the president.

I. H. KELLEY, Secretary.

CHAS. BRIGGS, President.

THE NEBRASKA ASSOCIATION.

THE Nebraska Association has set Wednesday, January 18, 1893, as the date, and Omaha as the place for the annual meeting of the dealers and manufacturers.

To the Members,—

The fifth annual meeting of the Marble and Granite Dealers' Association of Nebraska, will convene at Omaha, on Wednesday, January 18, 1893, at 2 o'clock, p. m., for the election of officers and the transaction of such other business as may come before it.

The headquarters of the association will be at the Hotel Dellone, corner Capitol avenue and 14th street. A rate of \$2.00 per day has been made to all members. This is one of the best houses in the city, and the regular rates are from \$3.00 to \$4.00 per day. Let every member be present. To those who are not members we will say: Come and see us at this meeting. We will use you well, and it may do you good.

The members of this association are not in it for any other purpose than to elevate the trade, and to cultivate a social and friendly feeling among dealers, thereby doing away with the constant misrepresenting and traducing of one another. You are hinder-

ing a good cause by not assisting us. Why not forget your ill-feeling for a short time and come to this meeting and get acquainted with your competitor? You will find him no worse than he has pictured you to be, and you may both agree to go home and run your business for your own interests instead of simply against one another. He can do you as much damage by the liberal use of his tongue as you can him, and why not forget your animosities and do business as friends. The members have tried hard to bring about such a state of affairs, and you have simply opposed every effort for the advancement of the trade's interest by staying away and finding fault.

We extend to you a friendly welcome to our meeting, and whether you join us or not, you will be shown what true hospitality is among friendly dealers, and you may go home with a new idea of why an association exists. All dealers are requested to acknowledge receipt of this notice. Come to this meeting.

J. N. KILDOW, Secretary.

F. M. KIMBALL, President.

THE QUARRYMEN'S NATIONAL ASSOCIATION.

FROM Sylvester Marshall, president, comes the following call for the second annual meeting of the National Association of Quarry Owners of the United States. Organization being the watchword of the time, it is needless to here enlarge upon its benefits to quarrymen as well as others in different lines of business. Special attention, is, therefore called to Mr. Marshall's call.

To Quarry Owners:—

The second annual convention of the National Association of Quarry Owners, will be held at the Grand Pacific Hotel, Chicago, February 21, 1893, at 11 o'clock a. m. A full attendance of all members is earnestly desired as business of special importance will come before the meeting.

A cordial invitation to attend this meeting is extended to every quarryman in the United States. If local associations in the more remote stone districts, will send delegates, they will be gladly welcomed.

There are to-day in the United States 4,000 quarries. These quarries represent an invested capital of nearly or quite one hundred million dollars. As in all other great lines of business, conditions arise from time to time and evils creep in which are entirely beyond the control of individuals. We quarrymen have arrived at that point where organization is an *imperative necessity*. Through lack of organization conditions have arisen in the stone trade requiring intelligent adjustment. I will mention one of many. Prices of all kinds of building material, excepting building stones, have advanced during the past year from 10 to 80 per cent. Why are the quarrymen not sharing in the general prosperity? There is a cause, likewise a remedy. Let us come together to seek the one and apply the other.

The National Association of Quarry Owners completed its organization last February. It is, therefore, just starting on a career of usefulness. It needs, and should have, the earnest support of every stone producer in the country.

All quarrymen expecting to attend the meeting on February 21, 1893, are requested to notify the undersigned not later than February 1, 1893.

SYLVESTER MARSHALL, President.



EDITORIAL COMMENT.

THE calls for a number of association meetings appear in this issue of *STONE*. These calls are worthy attention because they are extended to everybody interested in the stone industry, whether dealers or manufacturers, to attend and fraternize with the members of the association. The purely commercial significance of meeting for the discussion of the business side of the stone trade needs no lengthy screed to explain its importance. But there is another point worth considering, fully as much, perhaps, as the business standpoint and that is the social—the cultivation of sociability and the extension of mutual acquaintance. Generally speaking, matters of business will, in a degree, present themselves without the necessity of devoting the sessions of a long convention to the discussions of problems connected therewith. It is noticeable that business problems are more easily solved after a genial sociability has taken possession of men engaged in a certain line of business. The advice of *STONE* is, then, to attend the conventions for the purpose of getting better acquainted with workers in the same industry, and have as good time as is consistent with the dignity of the men composing the delegations. If business matters come up for discussion, make the talks as brief as possible, and don't, by any means, undertake any such discussion until the genial glow of good nature has pervaded the entire assembly. Stone men will thus set conventions in other

departments of business a good example, in the correct method of conducting association meetings.

ONCE more the sound of the stone cutters' hammer is heard in New England. The strikes are all settled and the men are at work on a bill running, until March 1895, and if no trouble occurs at that time to March 1898. It is said that the best of good feeling prevails and that business has a more hopeful prospect than ever before. All this is very encouraging, and friends of the manufacturers and men only hope it will continue. The contest is decisive, probably. Both sides have learned that each is able to carry out its ideas and enforce its demands. Arbitration is provided for by a local council of conciliation in all the settlements, and the indications are that war between labor and capital, so far as the New England granite industry is concerned, at least, is over.

POSSIBILITIES of the stone industry are beyond calculation. It isn't so very long ago that stone was recognized as a material fit for the construction of anything but the plainest buildings. The older stone buildings were generally a modification of the box shape, square and forbidding. But the architects' art and the builders' adaptation of new found constructive materials to modern requirements in building, have demonstrated that stone is one of the best materials for building extant. The result is a general

opening of quarries of all sorts of economical stone everywhere, and what has hitherto been hidden underground, or the pieces of which have cumbered the surface, is, to-day, used in compositions of great beauty and is found to be capable of the finest artistic expression.

THIS introduction and use of stone is, however, only in its infancy. As the architect becomes more proficient in his profession, as the builder comprehends and interprets the artistic creations of the architect in a broader and more appreciative spirit, the use of stone in the erection of buildings will increase, especially in the nobler class of buildings designed to impress by imparting a sense of solidity. In this respect nothing can take the place of stone, whatever advocates of other material may undertake to prove.

IN other directions, too, the use of stone is increasing. In all engineering operations, from paving a street to the laying of abutments for great bridges or the construction of walls along the sea-coasts and river-banks, stone is the coming constructive material, and stone producers, cutters and manufacturers can rest assured that there is no danger of the material they handle being supplanted by the weaker and less enduring materials in use in some places, either in great buildings or engineering work.

BETTER roads are demanded by the people of this land. The antiquated tracks, repaired in antiquated ways, are becoming nuisances and hindrances to the progress and development of the nation. It is strange, but none the less true, that until very recently the influence of roads upon the development of any section of country has been so little understood. So far as railroads are concerned the people have always demanded that the roads be good, while, at the

same time, they have practiced the most profligate methods and tolerated the most costly systems in their wagon road construction. It is difficult to understand why the rule enforced in one case hasn't been in the other.

ANCIENT nations, barbarians, modern people call them, understood the value of good roads, and some of the thoroughfares built by them centuries ago exist for models worthy to be copied by modern road engineers. The roads in Greece, some of them built five hundred years before the Christian era, remain as solid as when the engineer finished his work. There is evidence, however, that the apathy which has bound Americans so long is at an end. The frequent road congresses and the numerous resolutions adopted by conventions of various sorts, all tend to the belief that the public is at last awake, and will demand something better than mere tracks between two fences, and those tracks impassable three months in the year. The people want and will have better roads, scientifically constructed and capable of withstanding the vicissitudes of the frosts of winter, the excessive heat of summer, the prolonged rains of autumn and the fickle changes of spring without becoming mere lines of mud or sand through an otherwise attractive region. What the people earnestly demand, the people generally get; therefore, it may be deemed reasonably certain that the era of good roads is dawning. May the consummation of the objects sought not be far distant.

INDIANA leads in the matter of road improvement. A congress composed of delegates from every county assembled at the state house in Indianapolis early in December, and for three days discussed the question of highway improvement. Papers advocating all sorts of schemes,

and promulgating all sorts of theories were read and discussed, some of them being based on more than ordinarily clear conceptions of the needs of the case and what would most adequately meet those needs. The delegates were all thoroughly in earnest, and the full attendance and quiet listening to the papers and discussions indicated how firm a hold this matter has on the minds of the practical men of the state.

ONE plan outlined seemed as comprehensive as any that could be adopted, and its improvement over the present haphazard systems obtaining nearly everywhere is clearly apparent. The outline of the plan, briefly stated, is that a bureau of highways be established as a part of the state government, under the direction of a head engineer who should have charge of all specifications for highways in the state. An engineer for each congressional district and one for each county complete the organization. The state, congressional and county engineers to compose a council of three to whom all questions of building and repairing highways must be submitted, but from whose decision the people could appeal by petition. The action of such a board would result in a highway system harmonious and complete. This is but the briefest possible outline of the plan, but it was not presented in a formal paper and the speaker was limited, so that his larger outline was not much longer. But in the main the plan is the best presented in the congress, and, it might be said with truth, in any congress so far held.

IMMIGRATION and its restriction is a question which must be met and settled before long. Perhaps the time has not yet come when it can be completely stopped, but the time has come when it must be restricted in such a way that the

rush of undesirable elements from the overcrowded countries across both oceans, must be sifted and purified, so that the assimilation of incongruous masses of population shall no longer be required of this country. It is humiliating and injurious to the self-respect of this nation to see the extent to which the United States has been imposed upon by foreign governments and it is time it was ended. Next year is the fair, and the cholera. If the cholera is to be prevented from injuring the fair, the gates must be closed and no more cholera-bearing settlers admitted. If congress can be prevailed upon to do that, then it will go down in history as enacting one of the most beneficial laws on the statute books of the nation. Take down the sign; the rooms to rent are all occupied.

PANAMA CANAL affairs have again brought on a ministerial crisis in France, resulting in the overthrow of the Loubet ministry. Stormy scenes have been enacted in the Deputies and the refusal of attorneys to submit papers bearing upon the case has caused much bitter and acrimonious discussion. The vote of "no confidence," in which party lines were obliterated, illustrates the depth of feeling in the canal matter now existing in France. M. Ribot, one of the most experienced of French politicians was summoned to form a new ministry, but how stable it may be is uncertain. This matter of the Panama canal is of no consequence to the United States, excepting as it becomes a particular protege of the French government. Then our own government will be obliged to interfere, reasserting the Monroe Doctrine, and compelling complete neutrality on the part of France. The commercial rights of the United States are very important at the Isthmus, and the control of a canal

by a foreign government as important as one at Panama would be, is a menace to our commerce which cannot be tolerated. It is understood that the president will lay the matter before congress in his forthcoming message. The fact remains, however, that the danger of the completion of the canal by the French government, or any company under French control, is too slight to cause alarm. For the present the United States can watch the quarrels of the French government assured that the Nicaragua canal will be completed and abrogate all necessity for the one at Panama.

THE Panama railroad complication will compel the United States government to interfere to protect its commerce if the French receiver recently appointed persists in his determination to prevent through bills of lading across the Isthmus. Under the contract with the railroad company the Pacific Mail Steamship Company has built up an enormous trade between New York and San Francisco *via* the Isthmus. But M. Monchicourt has deliberately set about breaking up this trade by denying to American commerce its rights under the old treaty

between the United States and New Granada. The new French receiver has issued notice that on February 1, 1893, all through bills of lading heretofore granted the Pacific Mail Steamship Company will be abrogated, and that all contracts for the shipment of goods across the Isthmus must be made with the Compania Sud Americana, a Chilian corporation owned by British capitalists. M. Monchicourt claims the right to issue the order under the rights acquired in the Panama canal concession. It is a direct blow at American commerce, and calls for prompt and decisive action on the part of the United States government in the assertion of the Monroe Doctrine. If the position of the French receiver is maintained all commerce, heretofore carried on in United States ships in connection with treaty rights on the Isthmus, will be transferred to the vessels of other nations, and the humiliating spectacle of seeing what is practically domestic commerce conveyed in foreign bottoms will be the lot of United States ship owners. There is no question about the need of something being done about it before the time for the operation of the order arrives.



BOOKS AND PERIODICALS.

Fetter's Southern Magazine for December, the holiday number, surpasses anything yet done by that publication, though it was hard to improve upon some of the work already done by the magazine. The cover is white and gold, with an evergreen holly bough, typical of the dominant thought of the season. The frontispiece, illustrating "December," a poem by W. H. Field, is from an original drawing by W. Benneville Rhodes, an artist who is attracting much attention by the excellence of his work. The numerous other papers and articles are valuable additions to the current literature of the day. Indeed, *Fetter's Southern Magazine* is proving beyond fear of criticism, that it has a place to fill and a work to do in circulating the work of rising Southern authors.

From Lee & Shepard comes "Baron Trump's Marvelous Underground Journey," a juvenile, by Ingersoll Lockwood, author of a series of popular juveniles in the same line. Mr. Lockwood has, in this book, given even more convincing proof than in previous efforts, of his versatility, powers of invention and good humor. The Little Baron reads Don Fum's book on "A World Within a World," and starts on a tour of investigation for himself. His quaint adventures, after entering Polyphemus Tunnel are most entertainingly told and all that he saw among the marvelous peoples he visited is a chronicle of humor and satire which is irresistible. The book is written primarily for youth, but people of maturer years will enjoy the wholesome satire prevailing the volume, aimed at some of the follies of the present day. It is the best of Mr. Lockwood's works so far, and is uniform with those preceding. It is sold at two dollars.

Mrs. Julia C. R. Dorr's poem, "The Fallow Field," has been published in gift book form by Lee & Shepard, of Boston, for holiday presentation. The poem itself is a description of a spiritual condition which a fallow field is supposed to typify, and, it is said, was suggested by a field near Fern Cottage, Mrs. Dorr's

home, at Rutland, Vt. The illustrations consist of thirty full-page charcoal drawings and a corresponding number of vignettes, by Zulma De Lacy Steele, Mrs. Dorr's daughter. All are sketches of scenes near Fern Cottage and are typical bits of Green Mountain scenery. The artist is at her best in the vignettes, which are exquisite bits of landscape, indescribable, but none the less charming. Each stanza is separately engraved and the whole book is one of especial attractiveness, particularly to those who have seen Vermont landscapes. The book sells for three dollars.

Architectural ornament, it has been said, is a lost art in this land and nation, but a portfolio of twenty plates, representing Modern Romanesque, issued by J. O'Kane, 4 College Place, New York, disproves such assertions. This style of enrichment is known as Byzantine, and is probably due as much to the genius of Mr. H. H. Richardson, as to anyone else. There is little doubt that it was evolved from a study of the old forms, Byzantine and Romanesque, though it is in no sense a copy of either of them, nor of the essential features of either. These engravings are representative of the modern adaptation of an ancient style, and the examples were selected with care from specimens actually present in different parts of the country. The type or ornament represented is being more widely adopted each year as a graceful means of enrichment, easily executed and comparatively inexpensive. The pictures are what are known as gelatine plates, direct from photographs and they show the peculiar modeling with clearness and fidelity. They are 11x14 and the portfolio costs seven dollars.

It is hard to think that the noble, kindly, pure Whittier has gone from among us and that his pen is still forever. That pen which has done so much uplifting work for humanity, and whose aid has ever been extended to the poor and hopeless of all countries and all nations. Whittier's philippics against slavery gave him his early fame, but upon that founda-

tion of noble achievement he reared a magnificent superstructure of better work, a work for humanity and man. A shade of sadness comes over one as one takes up the little volume of Whittier's last poems published by Houghton, Mifflin & Co., entitled "At Sundown." In it one finds some of the finest imagery of Whittier's work, and "The Captain's Well," "The Vow of Washington," "Haverhill," "Burning Driftwood," "Between the Gates," and other shorter poems, will be looked upon as the final message of the inspired singer of humanity, and will make a deep impression upon the reader. One cannot help comparing the work of Whittier and Tennyson, now that both are gone. Tennyson's earlier work gave evidence of the humanity which Whittier practiced, and while in later life he strayed from the standard originally set up, Whittier lived his poems—his work was merely a reflection of his life. As a consequence his work gained purity and power as his years increased, while Tennyson's retrograded, and his later work did not equal the promise of his youth. E. H. Garrett has designed eight illustrations, sketched from New England scenery, to accompany the text, the whole making a very attractive volume for a holiday gift. The only fault to be found with the book is the persistency with which Mr. Garrett makes the limbs on his trees grow out straight as though the whole was built on the square and compass plan, New England trees do not grow that way, and Mr. Garrett should study them more closely before marring otherwise truthful drawings by representing them in that way. Otherwise the drawings are models of fidelity to nature. The book is sold at \$1.50.

Another attractive little volume from the same house is "Dorothy Q," "The Boston Tea Party," and "Grandmother's Story of the Battle of Bunker Hill," three of the most famous poems of Oliver Wendell Holmes, dealing with incidents of Colonial history. To go over them again and undertake to add anything of interest to the popular information concerning these three productions will be a waste of time. Howard Pyle has embellished the book with characteristic drawings and page borders, which illustrate the poems well, by interpreting the spirit of the lines, and introducing the reader to the characters themselves. The price is \$1.50.

In "David Alden's Daughter, and Other Stories of Colonial Times," a volume of twelve

short stories, by Jane Austin, an insight is given into the life and romantic surroundings of the early settlers of New England. These stories first appeared in the popular magazines and are here reprinted in permanent form by Houghton, Mifflin & Co., at the price of \$1.25. Criticism of what has already passed under the critical eye of the public is superfluous, and one may feel assured that, if the volume is read a good insight into some of the characteristics of the early New England settlers will reward their search.

The Foundry is a new candidate for public favor in trade journalism. The November number is a book of thirty-six pages, containing a great variety of matter suitable for those engaged in founding of whatever sort. It is said that the ranks of trade journalism are already full, and that the room to spare is at the top. Some publications reach the top by a long process of climbing. *The Foundry* does better and by a sudden leap attains the goal without difficulty, apparently. The Foundry Publishing Company, Detroit, Mich., stand sponsors for the magazine, and they have given the public the best publication on that subject yet devised. Success to the new venture.

THE CENTURY MAGAZINE IN 1893.—It would be hard for a person who cares for good reading to make a better investment than a year's subscription to *The Century Magazine*. No region is too remote, no expense too great, if it will only produce what the *Century's* readers want. This is the policy that has made it, as the *Pall Mall Budget*, of London, says, "By far the best of the magazines, English or American."

The November number begins a new volume and contains the first chapters of a powerful novel of New York society, called "Sweet Bells Out of Tune," written by Mrs. Burton Harrison, the author of "The Anglomaniacs." In this story the fashionable wedding, the occupants of the boxes in the Metropolitan Opera House, the "smart set" in the country house, are faithfully reflected, and the illustrations by Charles Dana Gibson, *Life's* well-known cartoonist, are as brilliant as the novel. In this November number begins also a great series of papers on "The Bible and Science," opening with "Does the Bible contain Scientific Errors?" by Prof. Shields, of Princeton, who takes decided ground that the Bible does not contain scientific errors of any moment, and who most in-

terestingly states the case from his point of view. Other articles in this series will include one in the December (Christmas) number, "The Effect of Scientific Study upon Religious Beliefs."

An important series of letters that passed between General Sherman and his brother, Senator John Sherman, is also printed in November, which number contains also contributions from the most distinguished writers, including an article by James Russell Lowell, which was not quite completed at the time of his death. The suggestion which Bishop Potter makes in the November *Century* as to what could be done with the world's fair if it were opened on Sunday, is one which seems the most practical solution of the problem yet offered.

The December *Century* is a great Christmas number,—full of Christmas stories, Christmas poems, and Christmas pictures,—and in it will begin the first chapters of a striking novel of life in Colorado, "Benefits Forgot," by Wolcott Balestier, who wrote "The Naulahka" with Rudyard Kipling. Papers on good roads, the new educational methods, and city governments are soon to come. Four dollars will bring you this splendid magazine for one year, and certainly no cultivated home can afford to be without it. Subscribers can remit directly to the publishers, The Century Co., 33 East 17th St., New York. They should begin with November, and so get first chapters of all the serials, including "Sweet Bells Out of Tune."

Frederick, the Great of Russia occupies a place in history second only to that of Napoleon I as an organizer of nations and a commander in war. Of the later life of Frederick all know something, that knowledge being limited by the extent of the study of history. But of the man there is little more to be said interesting to the reader after such masters as Carlyle and J. S. C. Abbott have written lengthy biographies of him. Neither from an American standpoint can one find much to praise in his tyrannical rule, excepting, perhaps, his love for and cultivation of music and letters. It is, therefore, with pleasure that one takes up *The Youth of Frederick the Great* by Ernest Lavisse, professor at the Sorbonne, Paris, translated by Mary Bushnell Coleman, and pub-

lished by S. C. Griggs & Co, Chicago. The book has 426 pages and shows evidence of great research and a clear understanding of the subject. In the youth of Frederick here depicted one finds some of the causes for his later military excesses and oppressions. A period of cruelty from Frederick William, his father, a training in the intrigues and treachery of a more than ordinarily treacherous court, imprisonments and punishments for comparatively trivial offenses, a complete alliance with courtiers constantly plotting against their king, and an early introduction to all the excesses and vices of an exceedingly vicious court, made of Frederick a cold, selfish, unloved and unloving man, but a man of boundless ability, who raised Prussia to become a foremost military power of Europe, notwithstanding that it was poor and had a small population, perhaps laying the foundation for the present German empire. The book is of surpassing interest and the style is simple and agreeable. It is an important contribution to the biographies of noted rulers, and ought to rank among the best of biographical studies.

The older magazines may be said to represent in their pages conservative thought, when a general view is taken of them all. This is especially true of reviews. Nearly four years ago a review was launched in Boston, under the editorship of B. O. Flower, called the *Arena* in which the distinctive policy of reviews was reversed and instead of being representative of conservative thought, it was founded upon the principle of progression and aggression. It has been the vehicle for expression of the most advanced and liberal thought of the day. The contributors belong to the dreamers of humanity, the ones who try to peer into the future and get some light to aid in solving puzzling questions of the present. The November number, which closes the sixth volume, contains a list of articles varied enough to suit any taste. The opening is Lord Salisbury's Afghan Policy by Rev. Thos. P. Hughes, D. D. The New Education and its Practical application, The West in Literature, by that shining western literary light, Hamlin Garland, Psychical Research, the Shakspeare-Bacon Controversy, and many other articles dealing with living matters make up a magazine of extraordinary power. It is the king of modern reviews, if one wants to keep in touch with modern progressive thought.

SELECTED MISCELLANY.

COST OF STREET CLEANING IN NEW YORK.

Estimates for cleaning the streets of New York and removing ashes and garbage during 1893 place the total cost at \$2,569,253. The total appropriations for this purpose thus far in 1892 have been \$2,093,355, about \$188,000 having been granted since the annual appropriation was made. The estimates for 1893 are distributed as follows:

Administration office force of 24, and supervisory force of 146, \$293,970; sweeping, 1,575 sweepers, 150 machine and water cart drivers, all at \$600 per year, and sundries, \$1,085,000; carting, 675 drivers at \$600.92, hostlers at \$720, shoeing and feeding 950 horses at \$182.50, and sundries, \$671,815; removal of snow and ice, \$40,000; final disposition by means of tugs and scows, \$322,800; new stock, as horses, carts, harness, etc., \$197,338; rentals and contingencies, \$58,330. The salary list varies from \$6,000 for the commissioner of street cleaning to \$600 for sweepers. The city is now divided into eleven districts, each under the charge of a superintendent. There are fifty-eight cleaning districts, each under the charge of a foreman. The superintendents and foremen are

each responsible for the cleanly condition of the districts under their charge, and the sweepers are also held responsible for the length of street which it is their duty to sweep. During the first eight months of 1892 there have been removed a total of 1,260,221 loads of dirt, against 1,135,045 during the same period of 1891, an increase of 125,176 loads, or about 11 per cent. The new street cleaning law provided for 1,500 sweepers, 750 drivers and 88 hostlers on the start, with an addition to the force of 5 per cent. per year. The commissioner, Mr. T. S. Brennan, reports that the system is efficient but that while the advisory committee which formulated the new law thought the above force would be large enough at the start to clean the whole city, it has been found that at least twice the number of sweepers are required to clean all the paved streets and avenues, allowing one sweeper to each 600 or 800 feet of streets, according to width. The down town streets are principally cleaned by hand and the upper part of the city by machines, operated at night.

THE GROWTH OF AMERICAN CITIES.

In 1890 more than eighteen millions of the people of the United States lived in cities which had a population of over eight thousand. This advance in city development is simply phenomenal. The history of mankind presents no parallel. The primeval forests and prairies of forty years ago are now crowded with rapidly progressing centers, filled with the last appliances of an age of invention. To every citizen of this, by now, twenty millions, the administration of his city government is a question of first-rate importance. Nearly all his taxation flows into that municipal treasury, and from it comes the school where he educates his family; the sanitation which protects his home from disease; the virtue or vice

which makes his dwelling-place a heaven or a hell. These statements are strong but not too strong. The welfare of twenty millions of Americans demands more than partial treatment, and cannot be expressed by merely commonplace truisms. A city government is not chosen to-day as a specific corporation constituted for a specific purpose. Probably in the four hundred and fifty cities of the United States the majority of the officers are elected on outside issues, and not always because of their fitness to manage the peculiar interests committed to their charge. And here is the tap-root of many evils, for politics are the concern of the nation far more than any city government can possibly be. They have a

supreme place, but that gives them no right to monopolize every other. Men should be trained to municipal affairs as a distinct profession, as they are in Germany. The expenditure of money is vast. During the financial year of 1891-2, the taxation in one of our great cities amounted to fifty dollars per head for every man, woman and child contained therein. These public funds should not be submitted to the caprice of professional politicians. Rather should the ends for which they are raised be more completely answered by a better, purer government of the twenty million, nearly one-

third of our total population, concerned in this vital question. Our country towns are giving up the majority of their youth to the city's incessant demand. The next century will see New York the largest emporium in the world, and many sister rivals scattered all over our territory. In view of these facts, we pronounce this question of city government a burning one; and if there could be any other with more far-reaching and imperative issues of our national life, we declare we should like to have it named.—*New York Ledger*.

THE LAND AND WATER OF THE GLOBE.

Mr. John Murray, a member of the Challenger expedition, and one of the highest living authorities on oceanography, has recently been delivering some lectures in Boston of peculiar interest to scientific men and students. Among many special papers of great value which have been published by Mr. Murray is one relating to "The Height of the Land and the Depth of the Ocean." In this learned monograph it is estimated that the area of the dry land of the globe is 55,000,000 square miles and the area of the ocean 137,200,000 square miles. He estimates the volume of the dry land above the level of the sea at 23,450,000 cubic miles and the volume of the waters of the ocean at 323,800,000 cubic miles. He

fixes the mean height of the land above the sea at 2,250 feet, and the mean depth of the whole ocean at 12,480 feet. Of course these results are only approximate, but they help to render our ideas of these matters more definite. In his paper Mr. Murray also estimates that the rivers of the world carry into the ocean every year $2\frac{1}{2}$ cubic miles of sediment. To this must be added the matter carried to the sea in solution, which is estimated at 1.183 miles of matter. Together, then, the amount of matter carried through the land each year is 3.7 cubic miles. It would thus, according to this circulation, take 6,340,000 years to transport the whole of the solid land down to the sea.

RESTRICT IMMIGRATION.

In the early days of the republic, ere steamships were known, and when locomotion was difficult, the possible influx of foreigners was very limited. We drew our immigrants from the British Islands, Germany and Scandinavia. We needed them; we offered good inducements to good men and got the pick of all those countries. The young, the energetic, the ambitious; men desirous of bettering their fortunes, men with capital—if not in cash at least in brains and muscle—an inventive force and adaptability to new conditions, came in response to the invitation. But this furnishes no argument why the United States to-day should constitute itself an employment bureau for the pauper labor of Europe. We want men who speak, or who at least will learn, our language who are willing to adopt our institutions and

become good citizens of the greatest commonwealth the world has ever seen. For their protection we ought to draw the line against the class who possess none of these desiderata. Without invidiously particularizing it can truthfully be said that a large proportion of the present immigration is neither desirable nor to be long endured. This undesirable addition to our population is increasing daily and ought to be stopped. We have quarantined against the cholera, let us quarantine against the mental, physical and moral degradation entailed by the continued admission of the refuse of Europe.

The ways and means of carrying out the needed reform can be found. The president of the United States discovered that he had ample power to deal with the cholera exigency

and acted accordingly. If the statutory power of exclusion does not exist, legislation can be had, for there is nothing in the constitution to inhibit it. Assuming that difficulties might arise if absolute prohibition of entire classes were proposed, the imposition of a practically prohibitive capitation tax would meet the case. This country is not hungering and thirsting for the coming of people who are shipped by European governments in order to get rid of

them, and who land at New York without a dollar, ignorant alike of our language and our laws. Such a tax—say one hundred dollars per head—would not keep out the class of immigrants whom we do want, but would prove an effectual barrier to the influx of pauper lunatics and pestilence-breeding nuisances with whom we are afflicted. It is time that the sacred right of self-protection was invoked. —*West Coast Trade*.

SHIPBUILDING IN THE UNITED STATES.

The shipbuilding trade of the United States, which for a long time has been at a very low ebb, has of late years shown some little signs of revival, though only so far as vessels for its own waters are concerned. Outside this charmed and protected circle it is quite out of the running, and cannot, in respect to quality and cheapness, compare for a moment with the productions of British yards for the carrying trade of the world, nor do we think it likely to prove a competitor in this respect until our trans-atlantic cousins have learned to build ships without the aid of McKinley crutches. Meantime they are content to jubilate within a rather small circle, and sing peans of praise to protected interests. The present extension of their navy is supplying them with opportunities just now in this direc-

tion which the mercantile marine has for a long time denied them, and the launch of the biggest warship ever built in the United States was fixed for November 5th, and was made the occasion of an imposing public function, in which a large number of naval and military officers took part. The total length of the vessel is 344 feet, the extreme breadth 53 feet, mean draught 21 feet, and total displacement 5,800 tons. She is to be fitted with double screws and triple-expansion engines, and have an estimated speed, with forced draught, of $20\frac{3}{4}$ knots. As compared with Blenheim, however, which has just been added to the British navy, and possesses a displacement of 9,000 tons, it will be seen the big American warship is comparatively small.—*Practical Engineer (London)*.

A COMPOSITOR'S LIFE WORK.

"Uncle Alex" Crockett has recently passed the sixtieth mile-post of his life as a printer. Mr. Crockett has spent the greater part of his life at the case and this is what he has accomplished. At an average of three columns per day, he has set up 56,160 columns. This type, put in a newspaper of eight columns to a page, would fill 7,020 pages. At five minutes per column it would take one year three months and thirteen days to read this amount of matter. If measured by the "em" it would aggregate 140,400,000. At thirty-five cents per 1,000 ems this amount of labor would be worth \$46,140. This much type would weigh 786,264

pounds. It would contain 421,200,000 letters. If these letters were laid end to end they would cover a distance of 5,816½ miles. It would make 11,233,000 lines. He could have set the unabridged edition of Webster's dictionary thirteen times, or the Bible forty-five times. If placed in one long column it would reach twenty-two miles. If the metal were moulded into bullets it would furnish ammunition to fight the war of 1812 and then have enough type left to set five copies of "Poor Richard's Almanac," three of Talmage's sermons and 297 patent medicine testimonials.—*Nevada Democrat*.

NOTES FROM THE QUARRIES.

The Davis Stone Quarry Company of Youngstown, O., have a large number of orders from all sections of the city for their stone, which is of a fine quality, and is highly recommended for building purposes.

The Cambria Marble Company, of Bel Air, Md. have secured space for an exhibit of marble at the world's fair. A slab six feet square and a pillar will be exhibited. The company would make a larger display but they have not been able to get more space.

The Edelman Hard Vein Slate Company, of Wind Gap, Pa., have made many improvements about their quarry and have put on a larger force of men. The Stanley Slate and Mantel Works of the same city are crowded with orders, hardly being able to keep up with the demand. The firm have decided to invest more money.

The old quarries at the County Home, West Chester, Pa., unused for some time, are about to be opened again. Parties at Glen Hall have entered into an agreement by which the lime can be used for a stipulated sum per bushel.

Stone cutting and polishing works have been started at Prescott, Ariz.

There was a vigorous strike in the quarries of John Breen at St. Cloud, Minn., caused it was alleged, by non-payment of wages due. Satisfactory settlement was made, however.

The stone industry of Mankato, Minn., is increasing each year. Fred Widell's quarry will give a person an idea of the magnitude of the industry. He is now employing 100 men, and during the year has shipped 75,000 tons of stone. He has still 300 carloads to quarry before he closes for the winter, as he has that amount contracted for. The pay roll at his quarry has been \$3,400 a month.

A quarry of stone acceptable for building the locks at Portland, Ore., has been found above the Cascades, convenient to barges, by means of which it may be floated to the works. It is expected that construction will begin after the holidays.

The Sarcxie, Mo., Lime Works have passed into new management, whereby it is expected that the output will be increased to 600 barrels per day.

The Baillie Stone Company of Berlin Heights, O., is a new incorporation with a capital of \$100,000.

Wilson Brothers, of Ellwood, Pa., have been awarded a contract to furnish the United States government the stone to be used in the Beaver dam. Contractors say it is the largest single contract ever let in that part of the state. The price is \$70,000.

A limestone to represent a building stone, will be shipped by Rev. D. Eberly, of Abbottstown, Pa., and Mr. J. Bittenger, of Berwick township, in the same state, to the world's fair at Chicago. The stone, which was quarried on the farm of the gentleman named, will be a cubic foot in size, highly polished and dressed by Messrs. Spangler & Son, of Abbottstown. The stone equals marble in beauty.

The stone used in the elevation of the Pennsylvania railroad tracks through Elizabeth, N. J., will come from the quarries at Stockton, N. J., and a very large quantity will be required. B. M. & J. F. Shanley are the contractors for the stone work.

The stone cutters of Seattle, Wash., have resolved upon a Saturday half holiday, and as the request does not demand pay for the half day the manufacturers do not object.

There are now twenty-five stone quarries on the Monon at Bedford, Ind., and near by, all the finest oolitic stone, and the shipments from these quarries this year have been the heaviest ever known. Train-loads of the Bedford stone have been shipped this season to New York.

The Leesville, O., Stone Company has a force of about thirty men engaged in stripping the surface from a large area for the next season's operations.

The Tennessee Brown Stone Company, are getting out some fine stone. They contemplate
G—Stone.

sending a carload to the Columbian Exposition. The stone is quarried near Welcker Mines, Tenn., and when first taken from the ground is very soft and can be easily cut into blocks. Exposure to the air makes it as hard as flint.

The Brandywine Granite Company, Wilmington, Del., have finished their contract for delivering stone for filling the gap at Delaware breakwater for the present year. Since August forty barge loads have been placed and the work is filled to near high water mark and evened off for the whole distance between the breakwater proper and the ice-breaker. It is estimated that it will cost about \$30,000 to complete the work by building the stone wall to the height of the breakwater.

All the lime plants between Manayunk and Bridgeport, Pa., on the west side of the Schuylkill will be pooled into one. Prices can better be maintained and the cost of production can be cheapened, as one superintendent will suffice for all the plants. There are seventeen different plants now and it is proposed to issue stock to each manufacturer according to the output and capacity of his kiln.

Granite men at Lithonia and Stone Mountain, Ga., had a singular experience with their colored workmen during the excitement attendant upon the possible visitation of the comet. All ceased work and kept up the most fantastic religious orgies. Marriages were postponed, all goods were held in common, but none were touched. It must have been a serious disappointment to the negroes to have the comet pass them by after all.

We are informed that H. L. Thornton, who has recently acquired ownership of the famous Blue Hole quarry at Bedford, Ind., will install an electric plant to operate all the machinery of the quarry. This we believe will be the first quarry in the world so operated. It will be the pioneer of a system that is bound to supplant the present agency of steam in such work.

John D. Allan, for fifteen years manager of the Vermont Marble Company's branch at Boston, Mass., has resigned and will leave their service December 31. The resignation closes twenty-one years of faithful service for the firm.

A new granite ledge was discovered in New Jersey, not far from New York City, in September. Examination showed that the stone resembled Quincy granite, not only in crystal but

polish. Companies of capitalists are being formed to operate the quarries and the outlook is for a profitable investment.

A rich deposit of opal onyx has been discovered near Pataha, Wash. The proprietors propose to put 500 men at work developing the find.

There are 104 gangs in active operation in the Vermont Marble Company's mills at Proctor, Vt.

Georgia has what is supposed to be a quarry of Caen stone. It is a peculiar and very expensive stone and hitherto has been found only in France, taking its name from the city near which it is found. The Georgia stone looks like light brown sandstone when taken from the quarry, but is very soft and can be easily worked. It hardens on exposure to the air, however, and finally becomes like flint in texture and resistance. If it is truly Caen stone, or something closely akin to it, Georgians have a valuable property.

Attention has been called to the fact that a large lime industry has been established at Anniston, Ala. since the Stone Production series now running in *STONE* was issued. The largest limestone quarries in Alabama are probably the E. G. Eaton quarries at Rock Springs, in the northern part of Calhoun county. They supply the flux for seven furnaces and ship ten and twelve carloads of rock a day. Just east of Anniston are situated the Blue Mountain Sandstone quarries. The Anniston City Land Company have opened and developed these quarries until they now show a face about a quarter of a mile long and fifty feet high. The stone is pink, soft when it first comes from the quarry, but hardens on exposure. The sale of the rock so far has been confined almost wholly to Anniston, and, as no systematic working has ever been carried on there, the opportunity for future development is certainly very large. Stone is now being taken out for a large church at Rome, Ga.

Quarrymen, stone workers, architects and decorators will be interested in the display of marbles, agates, jaspers, onyxes, silicified wood and other stone materials which will be comprehensively exhibited at the world's fair. In conjunction, numerous machines and tools for channeling, sawing, lifting, turning and polishing granites, sandstone, marble, etc., will be shown for the purpose of demonstrating the

facility with which great masses of stone are transformed into useful and ornamental objects and made suitable for the most skilled handicraft.

An excellent quality of gray sandstone, both beautiful and durable is being quarried along the line of the Great Northern, just east of Kalispell, Wash., and a large amount of it is being used in the buildings now constructed and under construction in Kalispell. Limestone and brick and tile clay abound in large quantities in the valley, which are rapidly being converted into building material. Pottery clay has been discovered that has been tested and found to be of a superior quality. Roofing slate is also obtained not far from Kalispell.

S. C. Dyke has organized the Akron Stone Marble Company at Boston, O., and the making of stone marbles has been begun. It is the first attempt ever made in America to make stone marbles, the trade being supplied hitherto wholly by importation. Only clay marbles have been made here. A long term lease of an old flour mill has been signed and ten runs will be put in operation, grinding 200,000 marbles a day out of block stone. Some thirty workmen are employed at the start and the number is expected to increase.

In the course of the state geological survey of Iowa, Chief Calvin found a bed of chalk stone and saurian clay measuring 50 feet in thickness on the Sioux river in Sioux City and which underlies about 600 acres in the city. He says it is 45 per cent. carbonate of lime, and that the best Portland cement can be cheaply made from it. It is in the same stratum as the celebrated Yankton cement beds.

The Lithonia Co-operative Granite Company is doing a large business at Brunswick, Ga.

Golden, B. C. building operations are seriously delayed by the lack of stone cutters.

The building of the Rio Grande Southern road is rendering the various resources of the southwest productive and adding to the wealth of Colorado. Twenty miles above the town of Dolores, on the Dolores river, is located a red sandstone quarry, whose product is already being shipped to Denver. The quarry is owned

by David Ramsay of Durango, to whose energy and enterprise its development is due.

A hill adjacent to West Chester, Pa., has been found to be composed of a hard granite-like stone, which gives evidence of being good for building purposes. The borough was contemplating some important engineering projects which will be greatly cheapened by the stone.

The product of the Bethesda slate quarry near Salt Lake City, Utah, is proving to be of the finest quality. The complement of employees has been increased and new machinery added so that the output can be increased to somewhere near the demand.

At a recent meeting of the Pennsylvania Hard Vein Slate Company, of Plainfield township, Pa., it was decided to double the quarry's working force.

The Robinson Quarry Company property at Newark, N. J., has been purchased by the Eli Teeter Land Company. The tract comprises thirteen acres with 800 feet front on the Passaic river. The quarry will be used as a spiral wire stone cutting plant.

A fine sandstone quarry has been found just north of Julietta, Wash., by R. F. Beale, and it is enthusiastically pronounced the best sandstone in America. It is said to be fitted for grindstones, something needed there, for all such stone is now shipped from Nova Scotia. The Julietta stone can easily be laid down at Spokane and other cities at sixty-five cents per foot, while the present cost is \$1.25. The First National bank of that city is built of sand rock from Lake Superior, and any expert will testify that the stone one mile from Julietta is in every way superior to it.

At Blount Springs, Ala., important limestone quarries were opened four years ago which have supplied a large amount of valuable material for the furnaces in the Birmingham district fifty miles away. The stone is almost free from magnesia and carries from one to two per cent. of silica. The stone is worked in benches, the upper ones forty feet above the railroad tracks, and the heavy blasts, bring down vast quantities of stone ready broken for the furnace. Larger development is promised.

MOMUMENTAL NOTES.

Caspar Buberl of New York is the contractor for the soldiers monument to be erected at Charlottesville, Va. He has placed the contract for the pedestal with the Petersburg Granite Quarrying Company. The style is plain, but extra fine work is being put into it. Mr. Buberl is modeling the bronze statue and tablets now.

Pat Cleburne's memory is to be perpetuated in Waco, Texas, by a monument erected by Pat Cleburne post C. V. The unveiling ceremonies will occur the first Tuesday in May.

C. E. Tayntor & Co. of Barre are fitting the massive base for the Estey monument. It is fifteen feet, eleven inches, by eleven feet, one inch and from sixteen to twenty inches thick. The weight is thirty-five tons.

A curious monument has been erected in the cemetery at Mumfordsburg, N. J. It is built wholly of petrified leaves and twigs taken from a neighboring swamp. The shaft is a copy of Cleopatra's needle, and the point is thirty-two feet from the ground.

Delay has prevented the completion of the Barnum monument at Bridgeport, Conn. this fall. The structure is of granite and will worthily commemorate the man.

Here is what the *Ledger* of Dubuque says about a matter of local interest. It might, with truth, be said that such doctrine applies to any place as well as Dubuque:

"Many citizens are very naturally inquiring why it is that our local marble cutters and monument builders were ignored in the contest for the furnishing of the shaft proposed to be erected to the memory of Julien Dubuque. If the monument is to be erected, and the people of Dubuque are to pay for the same, they propose that the local dealers shall have at least a fair chance in the field of competition with outside dealers. This is the prevailing sentiment, and it is the right one. If Dubuque dealers can furnish a better shaft for less money than outside parties, they should be given the job. In any event they should be given an opportunity to demonstrate what they can do in that direction."

The ladies of Westerly are to provide a granite urn to cost \$300 to be placed in front of the Rhode Island building at the World's Columbian exposition. A committee has been appointed and is already canvassing to secure the funds. The urn will be returned at the close of the fair and placed in front of the Westerly Memorial building and public library.

The field work of the surveyors in laying out the boundary between Pennsylvania and Delaware is about finished. The work has been executed by the United States Coast and Geodetic Survey. The entire distance of the line is about twenty-two miles. The work has been of a very tedious character and has taken over seven months to do it, involving the two states in a cost of several thousand dollars. The terminal point, on the Delaware river near Claymont, will be marked with a large granite monument and on the face of the monument the names of the joint commissioners from their respective states will be engraved. The Pennsylvania commissioners are Wayne MacVeagh, William H. Miller and Robert E. Monaghan. Those representing Delaware are Thomas F. Bayard, John H. Hoffecker and B. L. Lewis, M. D. The engraving has been entrusted to James Farnan, of Chester, Pa., by the above commission.

The statue of Gen. A. P. Hill was unveiled at Petersburg, Va., in November. It was an important event in the South.

The veterans of Asbury Park, N. J., have been collecting funds for a number of years to build a monument. They have finally decided upon one to cost about \$600, and the site has been located in the most central part of the town.

One of the large marble statues of Buddha, in the loan exhibition in the museum of the university of Pennsylvania has an interesting history. It was obtained in the East by Dr. Charles Huffnagle at the time of some uprising, it is said the Indian mutiny, and bears the marks of bullets, which have broken the hand and part of the arm. After being exhibited in Memorial Hall it was sold at auction with the remainder of Dr. Huffnagle's collection in

FOR SALE, WANTED, ETC.

Wanted—some good marble setters. Apply or address DAVIDSON & SONS, Chicago, Ill.

WANTED—A man that can polish marble and cut bases; write stating wages. SALES & SEELY, Lewiston, Mo.

WANTED—Fine designs of monuments and statuary to make for retail trade. R. A. CURTIS, 14 Cyclorama Place, Indianapolis, Ind.

WANTED—Situation as foreman of quarry, by experienced, sober man; can furnish excellent references. Address Room 23, 19 Park Place, N. Y. City

FOR SALE—Sullivan Channeling Machine with boiler. Used one year. Will sell with rack, etc., complete for \$700. ROMONA OOLITIC STONE CO., Indianapolis, Ind.

FOR SALE—One-third interest in a good pink, Tenn. marble quarry in operation. Three miles from Knoxville. Address "MARBLE," Knoxville, Tenn., care Dr. B. D. Bosworth, Church street.

WANTED—Experienced marble men, with capital, to join us in opening up a fine bed of marble, located at water's edge on one of the finest harbors on Lake Michigan. For particulars, address J. C. MCKEE, 19 Pearl street, Grand Rapids, Mich.

FOR SALE—One Cook, Rymes & Co. single cylinder, one drum hoisting engine and boiler; cylinder 6" diameter, 10' stroke; drum 22" x 12". Recently overhauled; in good working order. Address MACHINERY, care of Stone, Indianapolis, Ind.

WANTED Position as manager or foreman in cut-stone. Capable of taking charge of whole or any part of the cut-stone business. Fifteen years' experience. Correspondence solicited. Address, WALTER GRAVESON, 367 1/2 W. 7th-st., Cincinnati.

SITUATION WANTED—By a number 1 marble and granite man; twenty years' experience. A position as traveler for wholesale; no objection to territory. Strictly temperate; references furnished. Address W. M. D., 591 Richmond street, London, Ont.

WANTED—Mill or factory; a stone sawing mill, for twelve gangs and two or three rubbing beds. Must be located near sand and good water power, with good shipping facilities; New England location preferred. Address CASH, care of Stone, Ind'pls, Ind.

WANTED—A first-class foreman to take charge of stone-yards working from 30 to 40 sand-stone cutters. Must be practical, energetic and experienced with plans and soft stone. Permanent situation guaranteed to the right man. Address P. S. C., care STONE.

WANTED, SITUATION—By a first-class man, as agent or manager for a building stone quarry company. Is thoroughly posted in both the sale and quarrying of stone. Fifteen years experience. First-class reference given. Would prefer the west. Address, A. W., care of "STONE."

FOR SALE—A tract of 160 acres of extra fine oolitic land, located one mile south of Bloomington, and one-half mile from L. & N. A. & C. railway track. Stone has been fully tested, core drilled, and have begun stripping quarry; channeling to begin soon. Will sell in tracts of 30 acres more or less. S. C. DODDS, Bloomington, Ind.

WANTED, SITUATION—A thoroughly practical man of large experience in all details of marble or monumental work, would like to act as superintendent of the business for a good city or country shop; or would open up a new business in good locality, with party able to furnish about \$5,000 capital. Address, B. Granite, 553 Plymouth ave., Buffalo, N. Y.

WANTED—Situation with reliable marble and granite or cut-stone firm, by first-class, strictly sober and steady man; 26 years' experience as general workman, letterer and carver, 16 of which as foreman. Very best testimonials as to ability and reliability. Understand all branches of the stone business thoroughly. Address S. C. BRINK, 34 Carlisle ave., Cincinnati, O.

Hawley's Patent Sand Feed

Is used by all the leading firms—saws faster and better than any other sand-feed. More gangs using our feed than any other. Easily kept in order. Over 50 gangs working satisfactorily, using either crushed steel or shot with our feed. Can give best of references.

Orders solicited.

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Investment! **Investment!**
For Sale, Brownstone Quarry.

We have for sale a fine Brownstone Quarry, well equipped and well located; best of shipping facilities. This quarry will pay big profit. For particulars, address

CASE & PECK,
19 New Insurance Building, Milwaukee, Wis.

WANTED—Situation as superintendent or foreman by a practical man, competent to carry on the granite business in all its branches; is a statue cutter, carver and designer, has had good experience and can figure on all classes of building and monumental work. Good references. Address SUPERINTENDENT, care this paper.

FOR SALE—City Monumental Works, South Bend Ind. doing a business of \$15,000 to \$20,000 per year. A rare chance. Reason for selling our stone business has increased so that we have to devote our whole time to it. Only two shops. Population 27,332, from our last directory, just published. Address JOHNSON & MAY, South Bend Ind.

WANTED—A foreman in marble and granite department; a man who is competent to take full charge of a monumental business who is a good salesman, and who can lay off and cut inscriptions as well as superintend the business. Must be strictly temperate and of good character. Wages will not be a question to the right man. The CULVER MARBLE & STONE CO., Springfield, Ill.

White Limestone Quarry For Sale.

We would like to sell or lease half interest in a splendid quarry of white limestone. Quarry nicely opened, and stone lies in uniform ledges. Have side tracks, and power sufficient to run saws for dimension stone. Our plant is located close to the southern markets, on the Newport, News & M. V. R. R. Correspondence solicited.

F. G. WILLIAMS, Secy.,
Scottsburg, Ky.

Philadelphia. It now finds a permanent place, where it was identified by the bullet marks as the historical statue.

The Woodmen of the World always place a monument over the grave of every deceased member. Some of them are very elaborate in design, and are beautiful memorials when completed. Generally, however, a plain granite shaft, with two bases of granite and one of sandstone is erected, the whole about six feet high and costing \$100.

Action has been taking steps looking to the placing of a suitable monument over the grave of Gen. Joseph H. Weaver. His last resting place in Arlington is wholly unmarked, and it was determined that it should not remain so. A committee, with Secretary Rusk as chairman, was appointed to collect funds. The committee was scarcely named before Mrs. Gen. Hazen headed the subscription with \$10, and this was followed with a like amount by Mrs. Gen. Logan, and also Preston K. Hayward, of Company A, 8th Wisconsin Infantry.

A monument is being planned to perpetuate the memory of Theophrast Renandot, the founder of journalism in France, whose first paper, the *Gazette*, was issued May 30, 1631. The monument is to adorn the Flower market in Paris where the editor once had an office.

The Emma Willard Monument Association has about half of the \$10,000 required to erect the proposed monument. No plan for a structure has yet been adopted.

The Pratt mausoleum at Glen Cove, L. I., will cost, when completed, about \$150,000. There will be more than 2,000 tons of stone used in its construction.

The Confederate Monument Association is an organization at Raleigh, N. C., formed for the purpose of erecting a monument to the dead confederates. No definite plans for its construction have been adopted. The president, Mrs. Armistead Jones, is still soliciting funds to be used in building.

By law every soldier is entitled to a marble* grave stone from the United States government to mark his last resting place. Very few of the old soldiers' graves in Lawrence, Kan., are thus marked and a little less than a year ago Gen. H. S. Hall set about getting data to make a requisition for these stones. As a result twenty-six were sent for and have arrived in Lawrence, and will soon be placed on the graves of the dead.

The monument to Cyrus W. Field is being made in Ireland from a huge block of limestone. When completed it will be placed in the old historic burial ground at Stockbridge, Mass., where the Field family have been buried for generations. It will bear the following inscriptions:

CYRUS WEST FIELD.	MARY STONE FIELD,
Born Nov. 30, 1819.	Born Aug. 28, 1817.
Married Dec. 2, 1846.	

Died July 12, 1892.	Died Nov. 23, 1891.
---------------------	---------------------

At the base of the stone will be the other inscription:

LOVE IS IMPERISHABLE.

Agitation of the question of erecting a monument at Merrimac, N. H. to James G. Thornton, who was acting master of the United States Ship Kearsarge in her action with the Alabama off Cherbourg, France has been begun.

Veterans of the Mexican War of Baltimore, Md., have begun the discussion of the project of erecting a monument to Marylanders who fell in that conflict.

A monument to Col. Ellsworth is under consideration at Chicago. The design has not been definitely decided upon yet, but will probably be in the form of a sculptural drinking fountain. About \$1,000 has already been subscribed.

A committee has been appointed to raise funds to be used in the erection of a monument to Gen. Ripley at Charleston, S. C.

Rev. M. S. Brennan of St. Louis, Mo., is president of the Henry Monument Association, organized for the purpose of erecting a monument to the late Rev. James Henry. The efforts of the association are being encouraged.

The citizens of Paterson, N. J., are endeavoring to secure funds for the erection of a monument to Alexander Hamilton, once a resident of that town.

Foster post, G. A. R. of Nashua, N. H., is talking of raising funds for a monument to John Gray Foster, after whom the post was named.

The Huhnemann Monument Society of Washington, D. C., is a new organization for the purpose of building a monument to the memory of Samuel Huhnemann, the pioneer of Homeopathy.

Calder's statue of William Penn which is to be placed on the new public buildings in Philadelphia is so large that one must be 1,000 feet away to get the proper effect of the sculptor's effort.

THE N. C. HINSDALE'S SONS GRANITE CO.,
*Specialists in Mausoleums,
Artistic Monuments and Statuary,*

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REPRESENTING OUR "LITTLE GIANT" STEAM SHOVEL AT WORK IN STONE QUARRY.

These Shovels propel themselves, and so easily that they are indispensable in stone quarry, brick yard, highways, or general contract work, having a capacity of 800 to 1,200 cubic yards per tea hours with a $1\frac{1}{4}$ -cub. yard dipper. We also make the "Giant" Steam Shovel, which is built on standard gauge trucks, carries a $1\frac{3}{4}$ -cub. yard dipper, and has a capacity of 1,800 to 2,200 cubic yards.

F. WINTHROP PHILLIPS,

DESIGNER

—OF—

VAULTS AND MONUMENTS,

32 ABORN-ST., PROVIDENCE, R. I.

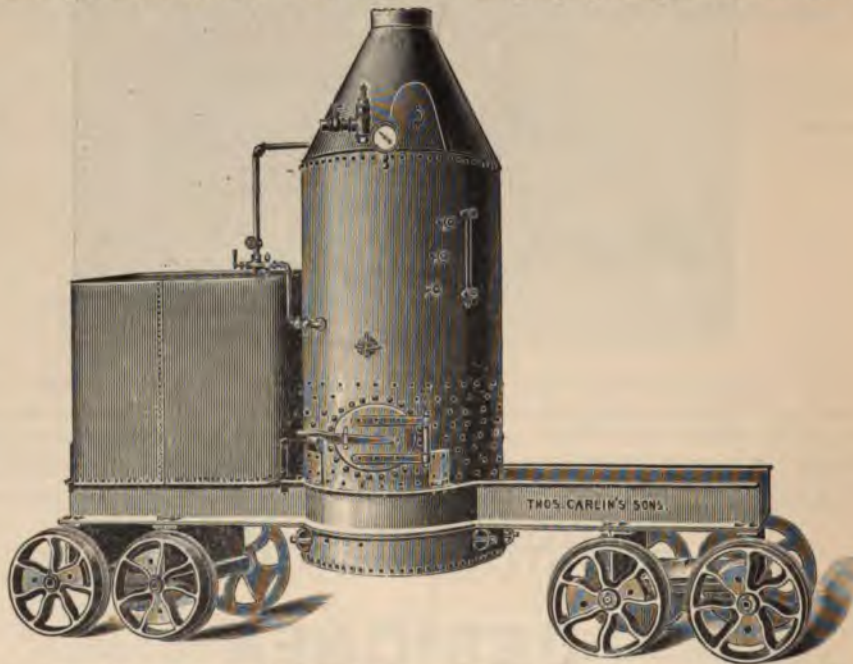
ADVERTISERS' DEPARTMENT.

From the Chicago office of the Trenton Iron Works, of which H. W. Elmer is manager, has been issued a book giving the latest and fullest information on wire rope transportation in all its branches and a complete price list of all the company's manufactures. Anyone wanting a copy can secure it by addressing the Chicago office, 616 Phenix Building. Business is reported good and prospects better, all of which indicates the esteem in which the firm is held by the users of such manufactures as they are putting on the market.

The illustration given herewith is that of a boiler, made by Thomas Carlin's Sons, Alle-

Another improvement is in so making the smokestack that the tubes can be cleaned without removing the stack. A good sized water tank is furnished and the whole is mounted on two four-wheel trucks, so designed that the machine can be used on light rails with short curves and can be quickly run out of the way of blasts. From what quarrymen have been heard to say regarding the need of such a boiler for use in operating steam drills, it would seem that Messrs. Carlin's Sons have successfully met a necessity.

A demonstration of a strong arm reaching far and grasping firmly, is shown in the recent



gheny, Pa., for use in quarries, and other places where a portable boiler is needed. The cut was made from one recently furnished a limestone quarry, and is of the regular vertical tubular type, but has a cast iron water bar at door and at water leg, and numerous handholes are placed so that sediment can be removed from crown sheet and water leg.

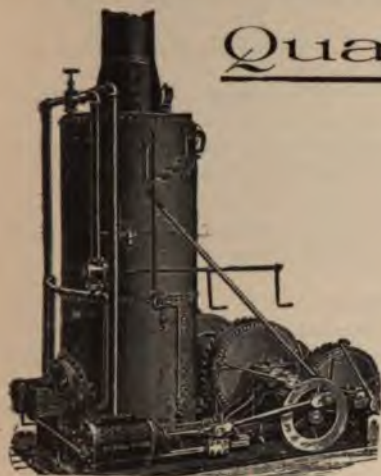
action of the American Hoist and Derrick Company, of St. Paul, establishing a branch office in Cincinnati. It's a pretty long stretch from the upper Mississippi to the Ohio, but the products of this firm are coextensive with the country, and the surprising growth of the business requires bases of supply closer to the markets for them, hence this addition to the

HOISTING ENGINES,

Quarrying

—AND—

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MACHINERY.

Send for 104-page 1892 catalogue.

American Hoist and Derrick Company,

(Late American M'f'g Co.)

ST. PAUL, MINN.

CHICAGO BRANCH—48 So. Canal-st.

SOME QUARRYMEN USE POWDER

AND FIND IT PAYS.



OTHERS would use it, but are afraid it will damage the Rock. It won't, if you know how. Hundreds have learned that it is the Safest, Speediest, Most Economical Way to Quarry

DIMENSION

∴ STONE ∴



Write to

*Knox
Can
Show
You
How.*

THE KNOX ROCK BLASTING COMPANY,
PITTSBURGH, PA.

list of branches. In this evidence of prosperity we congratulate the company, and, at the same time, commend its excellent judgment in the selection of a manager for this important branch of its business—Mr. Wm. L. Manson. The trade everywhere will recognize the gentleman as former advertising manager of STONE. A long experience in touch with the trade; a natural and acquired talent in the construction and operation of machinery; an extensive acquaintance, and a most genial personality, splendidly equips him for the successful management of this trust.

The Cincinnati office will be opened Jan. 1, at No. 54 Carew Building, Fifth and Vine streets.

The door flew open—a blast of Hoosier air penetrated the editor's den—heavy editorials, pithy paragraphs, and loggy write-ups were pitched into a vortex of cyclonic disturbance, and C. S. Leeds, of Leeds M'fg Co., Chicago, rose above the general wreck of matter, and blandly smiling as he held out his good right hand, mildly muttered: "Howdy?" "Good, proceed:" "Been down in the Bedford district! Knocked 'em all out! Booked more orders, at better prices, bigger lots, than ever before on one trip! Made money! Have a 'Principe de Gales,' first-class smoke! Going home as soon as steam will carry me! I'll turn out that work so quick will make your head swim! Got finest shops and best stone-working machinery in America! Quarrymen and stone contractors all feeling good! S'm I! Want two pages in STONE next month! STONE makes me busy! That's what I like! Good-day!"—and he went!

CAN ANYBODY BEAT IT.

CHESHIRE, MASS., Dec. 6, 1892.

Ed. Stone:

Dear Sir :—Your sample copy of STONE received. We are very much pleased with same. Inclosed find order for one year. We inclose you copy of analysis of our limestone made by our state assayers; would like to know if you have an analysis superior to this. If so we would be pleased to hear of same.

	<i>Per cent.</i>
Silicious matter.....	.031
Iron and alumina .....	.023
Carbonate of lime	98.80
Carbonate of magnesia.....	.037
Organic Matter.....	.035
Total.....	100.00

Very truly yours,

Cheshire Lime Mfg. Co.

Per W. B. Dean.

GEO. B. ECKHARDT, of Toledo, O., writes us that every dealer who tries his *Scientific Polishing Wheel* reports invariably that "they are the best we ever had," and "they are all that is claimed for them." With such recommendations, every dealer in need of a wheel should first try the Scientific, full particulars of which may be had by corresponding with Mr. Eckhardt.







Ice-Water Drinking Fountain
presented to the City of Chicago
by
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NEW YORK

STONE

VOLUME VI.

JANUARY, 1893.

NUMBER II.

STONE FLOORS.

WE Americans are emerging from our pioneer habits of building. The development of splendid stone quarries, the large quantities of iron and steel used in our structures, and the generally permanent character which is beginning to make so splendid an impression on the architecture of our cities, bespeaks the truth of the above statement. For many years our structures were temporary; afterwards they became more substantial, and now we are rapidly moving into the realm of artistic building, and establishing for ourselves an architecture.

It is not long since that a journal of this character could, with profit to itself and its readers, only consider what was distinctively structural. Together with the demand for other things, there is now the legitimate business demand for what is essentially artistic, which may become a part of the decorative features of the structural parts. Thus, pavements or floor coverings of important structures may come in for consideration. It is a very important detail of high-class building, in regard to which while we have not neglected it, there has not been a uniformly high class of information set before us.

We may advance our ideas of artistic building by going backwards into the world's history. In the matter of pavements history is not found wanting. Flat, hard, polished stones, joined in a decorative manner, have for many centuries been used to cover the floors of public edifices and private buildings of a high character. Nearly all quarries of limestone all over the world have banks or parts of its stone of more than ordinary solidity, which have been selected for paving of this kind. The Romans were very liberal in their use of marble, porphyry, granite, jasper and other valuable materials.

They realized that the people look down as well as up. They realized the demand for a pavement or floor covering which was in character with the rest of the structure. Many Roman pavements still exist, and are re-

markable exhibitions of beautiful designs, rich material and artistic perception. Such are the pavements of the Pantheon at Rome, the Basilicas and the Forum of Trajan.

The most substantial building which we know and which is shown to us in all of its character and completeness is the work of the thirteenth century. It is a hard thing for an American of this period, which is doing such splendid architectural work, to have to acknowledge that the best architectural productions, those having the highest merit, both structurally and



(Fig. 1.)

from an artistic standpoint, are the product of the thirteenth century. Nevertheless, it is a good thing for us to acknowledge this. Stone-cutting and

stone work generally was never so artistic and never so substantial as during that period. The artist of the middle ages did not have recourse to the rich material which was so common to Romans for use in their pavements. The decoration of the floors of their buildings was simpler, less expensive, though not less ingenious. They borrowed their ideas from another period of art. They went to the Greek sources; they took from the Byzantine and



(Fig. 2.)

the old Greek classic. The designs thus borrowed, however, were constructed in a manner suited to the time and place. Such work first showed itself in the twelfth century. While mosaics were rarely used during the middle ages, yet the paving work of that period was quite as individual in the method of its execution as any work which had preceded it. As suggested before, the pavements were made from limestone; when to specially decorate it, they cut the designs into the surface and then filled the incisions with lead, or mastic colored black, green, red, brown, and light and dark blue. Many of these pavements were destroyed, particularly those in churches. The march of the faithful was too much for them. Others were destroyed because of the custom, born in the thirteenth century, of interring notables under the pavement. This not only caused them to be removed in sections and thus injured, but oftentimes the section taken up was displaced by tombstones, which, however, were usually decorated according to the same general method as the original pavement, though the character of its design was not in full harmony and a part of the original work.

We give two examples of pavement of this kind from the church of Saint Menoux in France. (Figures 1 and 2.) The stone was white and the incrustated parts resinous black mastic. This work was executed in the twelfth



(Fig. 3.)

century. Fig. 1 formed the body of the pavement and Fig. 2 the border. It was a peculiarity of the paving of the middle ages that each stone, with a few exceptions, formed a complete design, the composition being secured by means of the juxtaposition of the stones. The engraving or carving was done in the workshop and the stones afterwards placed on the floor. Fig. 3 represents a character of design common to the thirteenth century. A warrior on horseback, covered with a shield and extending a pennant inscribed with his arms. Inscrp-

tions around the outside of these stones indicate that many of them were gifts and often by the person represented on it. This design has its figures and the horse colored red; the inscription and outlines are dark brown. Other paving stones of the same period form a collection of squares covered with grotesque figures, ornaments and personages seated on thrones. Others represent the liberal arts and the zodiac, yet others fantastic animals.

It was part of the idea of the artists of the twelfth and thirteenth centuries that they wished to preserve the appearance of the actual horizontal character of surfaces made to walk upon. The general character of the coloring and the forms used were not such as to suggest either depressions or projections. They carefully avoided these defects.

Fig. 4 gives a portion of the chapel of Saint Osmane. The altar step is shown at A. It represents the four virtues, and is bordered with black orna-

ments of quatrefoils surrounding fantastic animals, each having a meaning suited to its time. It is well to mention, in this connection, that some of the artists and architects of this period often show the bad taste to select decorative figures and designs which had a significance five or six hundred years ago, but are without any meaning when used to-day. It is altogether absurd for us to select figures and grotesques which can mean nothing now. A lesson which we may learn from studying these old designs is that they took such figures, designs and suggestions as belonged to their own period and their own lives, and used them in a decorative way. When we are able to use our knowledge of our own time in this same decorative spirit, we may feel that we are making rapid progress in our arts. The quatrefoil we may well use in a decorative spirit. But if we were to place within its borders



(Fig. 4)

one of these thirteenth century imps or saints we would be stepping outside of reason. It is to be noticed that while there is a great deal in this pavement—the one shown in Fig. 4—there is no suggestion of confusion. The different parts are separated in a delicate and highly decorative manner and without confusion. One way in which this was done was to ornament the steps on a smaller scale than the larger broader surface. The step in itself was smaller, it was important; the dec-

oration was in smaller figure in justice to the size of the surface; the character of the figures themselves, as well as their coloring, gives proper character to the step.

Fig. 5 gives the design of another pavement which was executed in a hard freestone. The fleur-de-lis is in black with rosettes in olive green.



(Fig. 5.)

The inscription is in red. Little squares of gilded glass, marked *a*, enrich the color scheme which would otherwise appear somewhat dull. The church of Saint Denis, near Paris, has some splendid examples of paving which date from the middle of the twelfth century. The engraving is about a sixteenth of an inch deep, filled with black, red, dark green, blue and brown mastic. Into it are worked colored or greenish white glass, painted and gilded under-

neath. The effect is that of a splendid piece of tapestry.

Certainly the examples given are sufficient to indicate the high character of this work. The centuries of its endurance is sufficient proof of the stability of color decoration in stone. In this there is a suggestion: many interiors of our buildings of good character might be greatly enlivened by the judicious use of color upon incised surfaces. It is work which would have to be done under the guidance of an artist, and carried out by a splendid handicraft; otherwise, an injudicious attempt would bring discredit upon all work of this character. We may build an ugly stone building, yet people do not say: "We will not have stone buildings." However, if we undertake polychrome work in stone and do not carry out the idea properly, people would be sure to say: "No more of it for us."

Louis H. Gibson.

DRAWING FOR WORKMEN.—VI*

BESIDES the compasses or dividers mentioned, there are several other kinds, among which are the "bow" or spring compasses. There are three or four forms of these, and we shall revert to several of them, each recommended by a peculiar excellence or adaptation to the draftsman's purposes. The most ordinary construction, and that usually found in the drawing-case, has the legs, one of which is a pen, moving freely on a joint, and terminating at the top in a small handle. The pen blades are a trifle longer than the other leg, in order that the latter may keep its vertical position throughout a sweep, and not lose its center. The performance of this little instrument is very satisfactory; a succession of small arcs and circles may be described rapidly and delicately, without leaving the centers strongly marked by the fixed point; and this contributes much to the beauty of a drawing, since nothing is more offensive than to see the paper studded with small holes, exposing every insertion of the compasses.

Figures 24, 25 and 26 show three kinds of these compasses. Fig. 24 shows the pen with the leg in a vertical position; this is obtained by moving it at the joint, c; the blades, B, are adjusted by the screw, F, and the box-screw, A, holds the legs firmly at their junction. The leg, A D, has a socket at its extremity, to admit a steel needle, which is held in place by the screw, E.

Fig. 25 shows the same kind of compasses with the exception of one leg, which, in this case, has a socket for holding a pencil, which is held in place by the screw, F. Compasses of this sort are seldom included in the set; but they, and indeed, all the other instruments, can be purchased separately.

Fig. 26 shows another kind, called spring-bow compasses, though limited in their application to small curves and circles, are very delicate and exact instruments, so far as their range extends. They are in principle identical with the spring dividers, already described, and have one leg provided with a holder for pen or pencil. The advantages of this construction can be appreciated only by those who know the difficulty of securing a small radius, with perfect exactness, by compasses that are extended and closed in the ordinary manner, and who have experienced the mortification of seeing an otherwise fine drawing marred and disfigured by small curves or circles, described with a radius deviating from truth in an error of per-

*By Fred T. Hodgson, author of "The Steel Square and Its Uses," through the courtesy of *The Operative Builder* of New York.

haps not more than a hair's-breadth, yet failing in one instance to reach the point of junction, and in another passing beyond it.

Another style of compass is the triangular or three-legged compass. This instrument has three legs, and is used for taking three angular points at once, or for laying down correctly a third point with relation to the other two. One form of construction is that of an ordinary pair of compasses, with an additional leg attached by a universal joint; and another contrivance, much recommended for simplicity and facility in its use, is a solid plate of three arms, each arm carrying a movable limb, into which a short pointed needle is inserted at right angles. In using the first, the compasses



(Fig. 24.)



(Fig. 25.)



(Fig. 26.)



(Fig. 27.)

are opened, and two points taken, and the additional leg extended in any direction to take up the third point; the management of the second is equally easy. The needle-points are successively adjusted to the angles by the flexure of the movable limbs. With either instrument the draftsman is saved a tedious process of constructing triangles. This style of compass is rarely included in a box of instruments, and the "learner" had better not purchase one in the early stage of his studies as he will have but little use for it before he can use the ones he has with dexterity.

Proportional compasses as shown at Fig. 27, are used for the enlargement or reduction of drawings. The simplest form is that named wholes and

halves, which has legs of the regular form on both ends, held together with a box-screw, which is placed one-third the whole length from one end; this instrument can be used to make a drawing of either double or half the size of a given copy. The proportional compasses, properly so called, is a more complicated contrivance, and admits of more varied application. It is in principle the same as the wholes-and-halves, with this difference, that the screw-joint, *c*, passes through slides moving in the slots of the bars, and admits of the center being adjusted for various relative proportions between the openings, *A B*, and *D E*.

The scales usually engraved on these compasses are named lines, circles, planes and solids.

The scale of lines is numbered from 1 to 10, and the index slide being brought to any one of these divisions, the distance, *D E*, will measure *A B* in that proportion. Thus, if the index be set to 6, *D E* will be contained six times in *A B*.

The line of circles extend from 1 to 20; and if the index be set to 10, *D E* will be the tenth part of the circumference of the circle, whose radius is *A B*.

The line of planes, or squares, determines the proportion of similar areas. Thus if the index is placed at 3, and the sides of any one square be taken by *A B* from a scale of equal parts, *D E* will be the side of another square of one-third the area. And if any number be brought to the index, and the same number taken by *A B*, from a scale of equal parts, *D E* will be the square root of that number. And in this latter case, *D E* will also be a mean proportional between any two numbers, whose product is equal to *A B*.

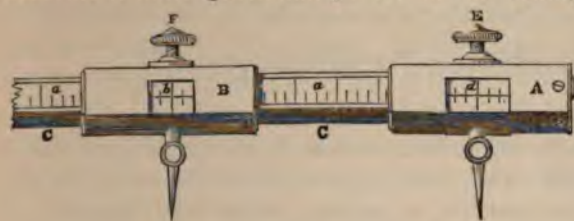
The line of solids expresses the proportion between cubes and spheres. Thus, if the index be set at 2, and the diameter of a sphere, or the side of a cube, be taken from a scale of equal parts by *A B*, then will *D E* be a diameter of a sphere or side of a cube of half the solidity. And if the slide be set to 8, and the same number be taken from a scale of equal parts, then will *D E* measure 2 in the same scale, or the cube root of 8.

The scale of lines and that of circles are those of most value to the draftsman. The first enables him to reduce or enlarge in any required proportion; and the second gives him the side of a square or polygon that can be inscribed in a given circle.

Great care must be observed in using this instrument, for should a point get broken or worn off in the slightest degree, the whole instrument is rendered useless.

BEAM COMPASSES are made of various materials and in many forms; Fig. 2 shows a very complete one, fitted up and lined in the most approved manner. This consists of two brass boxes, which have steel points attached; one of these moves freely on the beam, while the other is connected with a

fine screw on the end of the beam, and can be adjusted with extreme delicacy to any measure or radius. Referring to the engraving, we proceed to describe it more particularly: *c c* is the beam, which may be made of any



(Fig. 28.)

suitable material, and of any reasonable length; *a a* is a strip of box or holly, on which a scale is engraved if desired; *B* is a sliding brass box; it is held in position by the pressure screw, *F*; *A* is the

other box, made fast to the adjusting screw, *D*, which works in the end of the beam.

Sometimes the beam is of tubular brass or other metal, and may be round or square; if round, however, provision must be made for holding the points in line; this can be done by having a slot in the tube, and a "tit" or projecting piece on the inside of the movable box to fit in the groove or slot.

We have seen pens attached to these compasses, but as a rule they do not give the best of satisfaction.

There are several kinds of compasses besides the ones we have mentioned, but they are not in general use, and cannot be recommended as of service to the persons for whom these papers are arranged. These are known as the tubular compasses, the Portable or Turn-in Compasses, and the Double-Jointed, all of which the young draftsman can dispense with.

In choosing compasses, the draftsman should see that the joints at the head are connected with box-screws, each screw having two holes in it, to admit of their being tightened or slackened, as circumstances may demand. A slight turn of the screw, by means of the key, will keep the compasses in good working order, and care should be taken that the points are well protected, both while in use, and when laid away particularly must this care be taken in the case of proportional compasses.

[TO BE CONTINUED.]

YES, VERY.

"Very interesting and instructive monthly."—*D. J. Shull, Chambersburg, Pa.*

FROM DIGGING STONES TO MINING SILVER.

QUARRYING stone does not often lead to opening up mines of precious ores, and yet there have been instances where the quarryman who has delved after the chief building material of the earth has uncovered deposits of the richer minerals, or perhaps prehistoric remains that were "worth their weight in gold." We have never until now, however, heard of a quarryman who had the good luck to find a lot of silver mines when he was prospecting after a deposit of superior building stone. The exception is with that remarkable family of quarrymen, known to every quarryman, builder and contractor in this country, as the Malone Stone Company, of Cleveland, O., and numerous other cities of the country. One of the boys Malone, of whom there are seven, and all but one of them a stone quarryman or contractor, returned recently after a year and a half spent in Mexico in search of a profitable field for investment. This was Mr. H. P. Malone, and he reports wonderful success in his prospecting, having secured possession of two silver mines which were worked by the Spaniards several hundred years ago. "The mines are in the Sierra Madre range, in Sonora, and are proving rich beyond our brightest expectations," says Mr. Malone. "The mines we purchased from a priest, in whose family they had been held for generations. During their working by the Spaniards they were only divested of their richest ore, any other not being thought valuable enough to pay for transporting to Spain, where all the ore was worked. Then, too, the Spaniards were without modern machinery, and could not ventilate mine workings or pump out the water. All the ore was brought to the surface in baskets on the heads of the miners, who climbed up primitive ladders. The difficulties in the way were numerous. Our investigation showed that the workings were not deep as a rule and that only a small percentage of the good ore had been removed. Where the former owners had taken the ore from a space a foot thick, we found the ore to exist in paying quantities to a vein thickness of ten feet. We shall drive tunnels at the base of the hills and cut under the former workings, and our previous tests show that silver in fabulous quantities lies beneath our property. The mines have not been worked since the departure of the Spaniards because of the fear of the Apache Indians, who have only within a few years been driven from the country. The Mexican miners are too indolent to think of hard labor, as is the case with the inhabitants of nearly all tropical countries, and during the last fifty years have been living on the

old workings of many of the deserted mines in the country. Their practice was to cut away the pillars left standing to support the roof and sell the silver thus obtained, the roofs being allowed to fall in, thus burying the rich ore forever out of their sight. We have ordered the necessary machinery for a complete refining mill, and it will be shipped to the coast of the Gulf of California at once. Arriving there it will be placed on the backs of burros and mules and taken to the mines. By the same method of transportation will the bullion be carried back to the ships." As an instance of the immense richness of the country in mineral wealth, Mr. Malone states that out of one pocket in the rock discovered on the property of another Cleveland company, gold to the value of \$75,000 had been taken.

"STONE" A REVELATION TO HIM.

To the Editor:

DEAR SIR—On my way from Washington to Bristol, Tenn., I happened to find a copy of *STONE* in my gripsack, and although I have been buying it for my office, I never before had the time to spend in reading it. The magazine proved itself a revelation of what good editorial skill and judicious expense can do for an American journal with a worthy aim and progressive ideas. It should command the support not only of those directly interested in the sale and production of crude and manufactured stone, but also the close attention of architects, engineers, and persons meditating the construction of stone buildings.

In all, I consider it a long-felt want that has been fully and ably supplied; and it deserves and will receive boundless success from the fact that no one who has or meditates investments in the stone business can afford to be without it. There are only two slight improvements that I can suggest, one is the increase of stone-working machinery advertisements—there is good demand for information in this line—and the other is the publication of notices regarding the letting of public buildings, more especially the buildings under the control of the United States treasury department.

Very truly,

C. F. Z. CARACRISTI,

Consulting Engineer and Corporation Attorney.

Washington, D. C., Jan. 11, 1893.

WASHINGTON, D. C., CORRESPONDENCE.

THE official records of the customs division of the treasury department, for the month of October, the latest period for which statistics have been completed, reveal some interesting facts pertaining to the imports and exports of stone during that month, and through the courtesy of the treasury officials your correspondent is permitted to glean the following facts:

The dutiable imports of marble and the manufactures of marble in October, reached a valuation of \$87,675, being considerably in excess of the incoming business of the same month last year, when the imports were valued at \$54,263. For ten months ending with October, these imports were worth \$856,438, against \$653,223 during the corresponding period of 1891.

The dutiable imports of stone, and manufactures of same, including slate, reached \$48,633, against \$38,393 in October 1891. These imports for the ten months ending in October, amounted to \$424,519, against \$416,693 during the same period in the previous year.

The exports of unmanufactured marble and stone amounted to \$12,382, against \$10,804 in October last year, and \$130,001 for the ten months ending with October, against \$140,672 for the like period of the year before.

The exports of roofing slate during the month, amounted to \$5,014, against \$5,391 in October last year. The exports of this article during the ten months ending with October fell short of the outgoing shipments during the corresponding period of 1891. The comparative figures being \$39,004, against \$61,824.

The exports of all other manufactures of marble and stone reached \$61,378, against \$44,824 in October 1891. For the ten months ending with October these exports reached a valuation of \$445,384, against \$404,301 during the same period last year.

According to a report just received at the state department from United States Consul Pugh, the exports of marble last year, from Palermo, amounted to a total of \$724,80, the United States receiving none of these exports.

During the fiscal year of 1892, there was imported into St. Thomas, according to the recent report of United States Consul Horne, at that place, marble to the valuation of \$425 from the United States, and \$185 worth from Great Britain.

The dutiable imports of stone and manufactures of stone from the United

States to Manitoba for the last fiscal year, according to a report of United States Consul Taylor, at Winnipeg, amounted to \$2,356. The dutiable imports of slate, and manufactures of slate, during the same period, reaches a valuation of \$1,333. In neither of these classifications did the mother country, Great Britain, send competing shipments. Consul Sherman at Liverpool, reports to the state department, concerning wages paid in that city, and states that stone-masons there are paid eighteen cents per hour, and are required to work fifty-five hours per week. Carvers in building stone earn \$4.25 per day, of nine hours.

Our government consular representative at Hamilton, Ontario, reports to the state department, that for the last few months stone-masons and other laborers have been in the habit of vacillating between the cities and towns of Canada, and Buffalo, Rochester, Detroit, Erie, Lockport, and maintaining their residence and citizenship in the Dominion, coming over when business in their line is slack, and returning to their homes when they can secure employment. The consul states that he has recently noticed that many of this class are removing their families to some of the cities named, stating their intentions to become permanent residents of the United States. The same official states that the decrease in the stone exports of \$5,523, from Ontario to the United States, last year, simply meant that the stone used in the construction of the St. Clair tunnel at Sarnia and Port Huron, were shipped from the quarry of a Grand Trunk contractor, a few miles east of Hamilton, and with the completion of said tunnel, exports in stone ceased.

United States Vice-Consul Wood, at Rome, transmits to the state department, a report showing the exports from Italy to the United States, during the last fiscal year, in which appeared the following items: The value of the marble blocks received in this country from Italy last year, reached a valuation of \$469,042.96; marble chippings, \$2,502.62; marble slabs, \$99,526; marble statuary, \$159,565.03; marble tiles, \$7,493.14; wrought marble, \$32,649.64; wrought alabaster, \$59,734.28.

The stone imports from the German customs territory during the last year, as reported to the state department by Consular Clerk Murphy, of Berlin, consisted of 7,784,168 hundred kilos, worth 43,799 marks. The exports for the same period amounted to 5,415,661 hundred kilos, valued at 25,500 marks.

The court of claims here, has given judgment for \$66,835 in favor of Stout, Hall and Bangs in their suit for additional compensation for granite furnished for the congressional library building.

In a corner of a marble-yard in this city, just over the low board fence, and surrounded by blocks of ordinary building stone, was seen the other day a block of gray granite that was gradually sinking into the earth by its own weight. It is, perhaps, two feet square and four feet high at the

highest point, the top slanting down from the center on either side at an angle of perhaps forty-five degrees. The block is not even polished, and is finished in a rough surface, and is perfectly plain except on one side where the writer read in plain, yet bold letters, these suggestive words;

SALMON P. CHASE,

Born

January 13, 1808,

Died

May 7, 1873.

Said the proprietor, who seemed to know little, if anything, of the history of the man whose grave the stone had marked :

"We drew the stone from Oak Hill cemetery in the city, and have had it for quite a long while, some five or six years, I think, but do not remember just how long. If I remember rightly the body was taken to Mr. Chase's old home. (in Ohio, I think,) and by direction of Architect of the Treasury Mullett, now dead, we drew the stone away, and have been ever since hoping some man would come along and buy it of us at some price. It is a good solid block of stone, and if good for nothing else would work into a foundation wall to good advantage. Or, by cutting it down on one side to take off the inscription, and on the other side to keep the proportion perfect, we may be able to use it to mark some other man's grave."

While it is true that all that is mortal of Salmon P. Chase now reposes in one of the beautiful cemeteries in Cincinnati, with a grand and costly monument to mark the spot, this has not long been true. For more than a dozen years the grave of this leader among leaders, this ablest financier of his time, and who was so long at the head of the nation's chief judicial tribunal, was marked only by an ordinary block of granite, that is even now thought of no consequence except to be offered for sale for a few dollars to the highest bidder at the nation's capital.

E. A. O.

"I think your journal contains more information for the money than any other publication printed on subjects relating to stone and quarrying."—*A. Myers, Toronto, Ontario.*

"Please send me STONE. It is the best thing I have seen in the stone publications of America. I am the author of "Ornamental Stones of the Three Continents," published by the Italian Government, and should be pleased to contribute to your valuable magazine."—*C. F. Z. Caracristi, Consulting Engineer, Washington, D. C.*

SANDSTONE INTERESTS OF NORTHERN OHIO—III.

PROBABLY none of the sandstones of northern Ohio enjoy greater popularity than the Amherst article, which is quarried by the Cleveland Stone Co., the Malone Stone Co. and the Ohio Stone Co.—all heavy operators in stone for building purposes. The district producing this stone is quite extensive, comprising several hundred acres for each company. The Cleveland Stone Company designate their properties in this section as quarries Nos. 6, 7, 8 and 9. The first two comprise about 151 acres in Amherst township, about two miles south of the village of North Amherst, which is a station on the main line of the Lake Shore & Michigan Southern railroad, about thirty-two miles west of Cleveland. A branch railroad track extends into the quarries, part of which came into the possession of the Cleveland Stone Company at its organization and the balance has since been purchased. About five acres have been quarried out to a depth varying from seventy-five to ninety feet. The rock is about 110 feet deep.

These quarries were first opened about twenty-five years ago, and have been constantly worked ever since. At present the rock has to be hoisted to the surface in order to load it on the cars, but the company has been engaged for some time in quarrying out a roadway which will enable them to run cars into the bottom of the quarries. This improvement will be completed next spring. The output consists of building stone, curbing, sawed flagging and grindstones used in the manufacture of axes and edge tools. The plant at these quarries consists of seventeen derricks, seventeen



PANEL OF GRAPES CARVED IN AMHERST SANDSTONE.

c—Stone.



EAST END QUARRY NO. 6, CLEVELAND STONE COMPANY, NORTH AMHERST, OHIO.

steam hoisters, nine boilers, nine engines, eleven channeling machines, thirteen steam drills, five steam pumps, two grindstone turning lathes, and one sawmill containing eight screw feeds and three box balance feed gangs.

Quarry No. 8 consists practically of three quarries, which are situated about two miles west of the village of North Amherst. Railroad tracks extend into all of them from the main line of the Lake Shore & Michigan Southern railroad. These quarries comprise about ninety-seven acres, of which about twelve acres have been quarried out. They were first opened in 1847, and have been constantly worked ever since. They came into possession of the stone company soon after its organization. The stone stands in bluffs, and is about fifty-six feet deep, thirty feet of which is buff colored stone and the balance blue. The product consists of building stone, sawed flagging and grindstones used in the manufacture of axes and edge tools. The plant consists of ten derricks, ten steam hoisters, five boilers, five engines, three channeling machines, five steam drills, three steam pumps, three turning lathes, and one sawmill containing three screw feed gangs. A little less than two miles northeast of the village of North Amherst is what is known as quarry No. 9, but which in point of fact is two quarries in close proximity to one another, and therefore designated by but one number, after the plan of the Cleveland Stone Company. Branch railroad tracks extend into them from the main line of the Lake Shore & Michigan Southern railroad. The properties comprise about thirty-five acres, of which about five acres have been quarried out. The rock varies in depth from forty to eighty feet. The product consists of building stone, sawed flagging and large grindstones used in the manufacture of axes and edge tools. The plant consists of seven derricks, seven steam hoisters, four boilers, six engines, one channeling machine, two steam drills, four steam pumps, two grindstone turning lathes, and one sawmill containing three screw feed and two box balance feed gangs; also a complete machine shop, equipped with lathes, shapers, planers, steam hammers, etc. There are at present employed in the Cleveland Stone Company's Amherst quarries (namely, Nos. 6, 7, 8 and 9), 550 men.

The property of the Malone Stone Company is located about two and a half miles south of North Amherst, on a branch of the Lake Shore & Michigan Southern railroad, with which they have tracks connecting. This property (twenty-four acres of the most valuable quarry land in the Amherst region) was acquired by the Malone Stone Company five years ago, and the rapid and thorough development of their group was in keeping with their general vigorous policy, and without precedent in this section. It has been a large producer of the very best quality of Amherst building stone from the first season, and is a most complete plant, thoroughly equipped with

modera quarry and mill machinery. The plant at present consists of the twenty-four acres of quarry land above mentioned, together with several railroad switch and storage tracks, connecting with the Lake Shore & Michigan Southern branch, a mill containing four gangs of saws, large

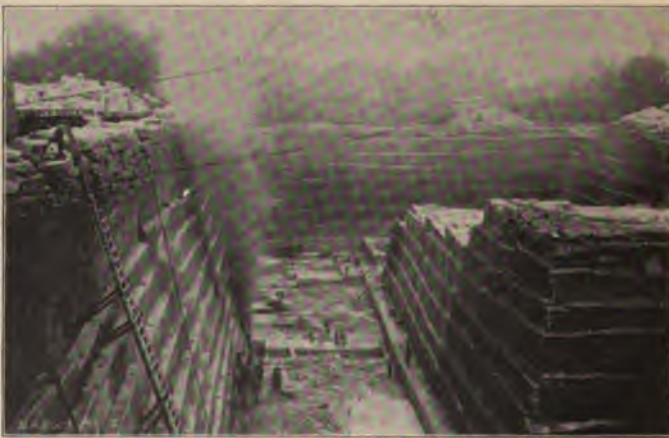


AMHERST QUARRY OF THE MALONE STONE COMPANY.

capacity, together with blacksmith and machine shop, five 20-ton steam derricks and hoisters (others now building), five steam channelers, four steam drills, two steam pumps of large capacity, machinery for the manufacture of grindstones together with such other equipment

as is necessary to quarry and handle their large product, which consists chiefly of rough and sawed building stone, curbing and flagging. One especially valuable feature of this quarry is the great body of good rock which is now quarried to a depth of 120 feet.

The second largest producer of sandstone in the United States is the Ohio Stone Company. They have three quarries in the Amherst district; the first is known as their south quarry, and is located on a branch of the L. S. & M. S. railroad, about two miles south of the village of North Amherst. This property was purchased and opened



AMHERST QUARRY OF THE OHIO STONE COMPANY.

six years ago and comprises twenty-five acres of one of the best stone deposits in this famous district. The plant is thoroughly equipped with the

latest and most improved machinery for producing building stone, curbing, sawed flagging and grindstones. The quarry at present is opened to a depth of ninety feet, and by actual test they have thirty feet in depth more of rock before striking the shale or bottom of stone deposit.

The company owns a steam shovel made by the Bucyrus Steam Shovel and Dredge Company, which is used in stripping the earth and shell from top of rock, and also have a locomotive of their own to do their switching at quarry, instead of depending upon the railroad company to do this work. The other two quarries are known as the "Ohio" quarry and "Wilson & Hughes" quarry, and are located about two miles northeast of Amherst village, and together comprise about seventy acres. These quarries have been opened for over twenty-years, and it is the intention of the company during the present season to operate these quarries to their full capacity.

The Ohio Stone Company is also quite extensively engaged in the manufacture of grindstones, having two lathes at this quarry for the purpose as well as several equipments elsewhere. Of their other possessions as well as those of the Cleveland Stone Company, I will have something to say in a subsequent article.

Ira P. Rowley,
Artist-Editor STONE.

THE MOVEMENT FOR GOOD ROADS IN INDIANA.

To the Editor:

SIR—Will you please note the inclosed copy of a circular letter which is being sent to all interested in good roads, so far as their addresses can be obtained? You will greatly assist the association by publishing the letter in your next issue, and by making such editorial comment as will, in your judgment, most conduce to the betterment of our highways.

Very truly,

Indianapolis, Dec. 24, 1892.

EVANS WOOLLEN, *Secretary.*

THE CIRCULAR.

Indianapolis, Dec. 24, 1892.

DEAR SIR—The Road Congress, composed of more than 500 delegates appointed by boards of county commissioners, municipal governments, commercial organizations, agricultural societies and institutions, and of others interested in the betterment of our highways, was held under the auspices of the Commercial Club, of Indianapolis, at the State Capitol, on the 6th, 7th and 8th inst. It is believed that much was accomplished toward the establishment of a better system of road making in our state.

Those present organized the Indiana Highway Improvement Association, of which you are respectfully urged to become a member. You can do this by remitting to the undersigned one dollar in full payment of dues for 1893. The effectiveness of the association's work, of course, largely depends upon the size and quality of its membership. For this reason your coöperation is asked, and for the further reason that it is believed you will profit by participation in the distribution, by the association, of literature on good roads.

You will greatly oblige and help the association by sending to its secretary the names of persons in your community who are likely to be interested in this work, and by making any suggestions which may occur to you.

Very truly,

EVANS WOOLLEN, *Secretary.*

HYDRAULIC CEMENT AT MILWAUKEE.

MILWAUKEE Wis., has within the last few years taken an important position in the ranks of hydraulic cement producing centers. The quality of cement manufactured here has such an established reputation that it is unnecessary to make any comments as to its quality. The amount placed on the market daily speaks more in its favor than any remarks I could add. It is the intention to explain the process of manufacture as carried out by the cement companies of Milwaukee and not to advocate the use of any special kind or quality of cement. The beds of cement rock which underlie the Milwaukee river and adjacent banks come nearly to the city limits and about four miles from the business center of the city, and from that point bear off in a northeasterly direction and come out on the shores of Lake Michigan at a point about four miles still further northeast. How far it extends out into the lake is at present unknown, but it is known to extend from 800 to 1,000 feet from the present shore line and is only covered with from eighteen to twenty-four inches of water, and along the shore is exposed and worn smooth by the action of the lake waters and presents the appearance of a paved street. The rock crops out of the bluff about six feet above the lake level.

The cement heretofore made has all been taken from the bed of the river and the adjoining banks. There has, however, recently been a new company organized of Milwaukee capitalists to develop the resources and manufacture a high grade of hydraulic cement. The great wonder is that this rock should have lain exposed for so many years unnoticed. Surveys show this bed of rock to extend back under the bluff for at least one and one-half miles. The bluff at the central point on the shore rises to a height of about 1,022 feet above the water line, so that all rock taken from the bank will have to be mined. The present intention is to build a breakwater and pier about 1,000 feet from the shore and carry wing piers back to the bluff. This breakwater or pier is to be built water-tight, then pump out the basin and lay the rock bare, and work in an open quarry. This pier will also allow boats to deliver cargoes of coal and take cement for shipment. There are also railroad facilities at the mill door for shipment of products of the mill, which will be located on top of the bluff. [See drawing.]

As the process in all the mills of Milwaukee is about the same, a description of how this plant is operated will serve to illustrate the whole process of manufacture. The rock will be hoisted up the incline railways by cables

in dump cars. The railways will be built of timbers up to the top of the bank, and along one side have steps framed between the stringers with a hand rail. This inclined way will be anchored to the rock at the bottom and to a stone pier at edge of bank; from there the tracks will be built entirely of iron to top of kilns and across the top of same, and held in position by channel bars and "I" beams riveted to kilns. There will be a walk alongside of track and iron railing. There will be a pawl on each car to work in a toothed rack full length of railway to prevent accident in case of breakage of cables. The kilns, which rest on heavy rock and cement foundations, are made of heavy steel plates riveted same as a boiler and have brackets near the top for supporting run-way around top of kilns. The kilns are lined on the inside with six inches of earth or clay well rammed and with thirteen inches of hard-burnt brick, and on the inside of this with nine inches of best quality fire-brick laid all headers in the best fire-clay. The bottoms are all hoppers and carried down to foundation. An opening is left three by six feet for removing the burned rock at the bottom. The top is carried in to increase draught and combustion. The hoisting towers are frame construction, are located at the ends of kilns and supplied with Lidgerwood hoists, which are driven from the main engine, and which are so arranged that they can be operated independently of the mill. The power is transmitted from engine to the hoists by manila rope. There is an electric bell for giving signals from the quarry to the hoist house.

The burned rock, which is taken from the bottom of the kilns, is loaded into dump cars and taken up another inclined railroad and dumped into one set of sizing crushers which reduce the material to an even granular size. This is elevated and put into a steel covered reel and the coarser parts passed to the second set of crushers, which reduce the material to such shape as will allow the coarse stones to do their portion of the work. The parts passing through the perforations of the reel are again screened over a sieve and the coarser parts passed to stones with material from second crusher, and the material passing through the screens is sent with finished product or cement to the packers. From the first set of stones the material is elevated to another set of sieves and tail or coarse part put on the finishing stone and is all reduced to finished material and all spouted to one elevator and from there to the packers. All material is packed on the stream and never allowed to collect in bins. All crushers are the kettle type and are all adjustable by means of lighter lever and screw. All stones are French buhr and solid block, extra heavy; all curbs are iron lined. Stone and crushers are driven by spur gearing off an upright shaft which is connected to the main line by bevel gearing. The main line is coupled direct to the engine shaft, all carried on stone piers. All stones and crushers have iron husk frames which are bolted to stone foundations. The hoist from

kilns to crusher is straight faced paper and iron friction operated by eccentric boxes. The packers are operated by a cam on the packer shafts which raises the barrel and allows it to descend by gravity, thereby jarring the cement and packing firmly in the barrels.

Power is supplied by a battery of two boilers of such capacity that one can be used while the other is undergoing repairs. The engine is a compound Corliss. The packers are located in the second story of the warehouse and the finished product is spouted direct to the cars through openings in the second story warehouse floor. The building is frame covered with corrugated iron and steel roof. The engine and boiler room is brick covered with steel roof. The plant when completed is expected to have a capacity of 1,600 to 2,000 barrels per day.

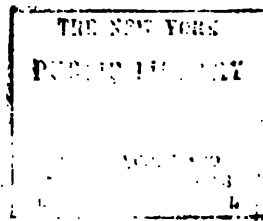
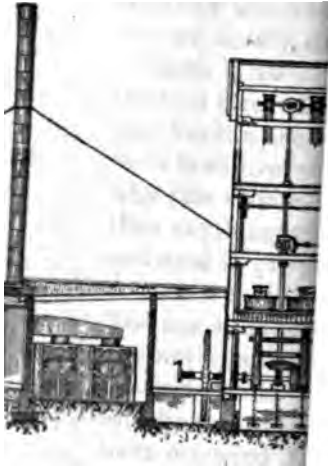
The increasing demand in this country for good cements has led to more improved methods of manufacture, and, as a consequence, has lowered the price to a point where it can be much more freely used, and now work is called for to be done with cement that was formerly done in lime and sand mortar, and the cheaper it becomes the greater will be the demand.

A. E. Baxter.

CEMENTS.

THERE is hardly an article so extensively used as hydraulic cement, about which so little is generally known. By cement, in the present case is meant both the "artificial" or Portland cement made by combining chalk and clay in the required proportions, and the "natural" cements, made by burning the materials found ready mixed in nature, both varieties having hydraulicity or the power of hardening under water.

Portland cement, discovered a little over a half century ago by Adspin in England, is the only variety used upon the continent to any extent. It is made essentially by grinding suitable clays and chalks in proper proportion, mixing thoroughly when wet, burning the same in kilns at a high temperature and afterward grinding the clinker between stones. The natural cements, or Rosendales as they are often termed, are made in the same manner, except that the material for them is found ready mixed in nature and requires only to be broken, burned and ground. The skill in the manufacture of all lies in the selection and proportioning of the ingredients and comes from constant experience. The burning and grinding is an art easily acquired, as it is always a certain quantity. Poor Portland cement oftenest occurs from too much chalk, underburning and undergrinding, or any combination of the three, the opposite defects being less often found. An excess of chalk gives the presence of free lime in the product which may in time expand and destroy the true cement already hardened, yet there is



always a temptation to use it as it increases the initial strength very much. Too much clay produces a quick setting cement of poor quality. The faults of the natural or Rosendale cements are due to very many causes but are mainly due to careless mixture of the rocks or to underburning.

There is hardly a class of masonry built but that the hydraulic cement is the best cementing agent or matrix to be found. Its use is rapidly growing, but the use of fat lime, both with and without sand, in buildings of all sorts is still very common with the architectural profession as a class. Just why this is true is hard to explain, but it is probably due to custom more than anything else. One can easily demonstrate conclusively that cement and sand in proportions which will cost the same as the lime and sand generally used, will be much stronger at first and very much more durable. The use of hydraulic cements, with but few exceptions, should be universal and not confined to heavy buildings and engineering works in masonry. Concrete walls, foundations, backing, etc., are uses where concrete is showing the real value of hydraulic cements in such works. Some few failures have occurred from lack of sufficient testing of the raw materials, but to-day there is no reason why the heaviest foundations or even buildings themselves should not be made of a single stone in this way.

In order to obtain a cement which can be depended upon the general use of the testing machine is necessary and there are to-day but few municipal engineering offices of any size but are equipped therewith. The usual method of procedure is to tap the barrels as they arrive on the work and with the samples thus obtained make briquetts in moulds having a cross section at their center of one square inch. The briquetts are made from cement alone and from cement and sand combined, the latter being the more reliable method for large works, since some cements may have a high tensile strength by themselves but have little or no power of cementing sand particles together, which, of course, is the true use of the matrix. These briquetts after remaining a definite time in water are broken in an accurate weighing machine and their tensile strength recorded. It is now well known what a good cement should show as a minimum tensile strength per square inch and any variations from those figures is a sure indication of variation in the quality of the cement, and, if serious, should allow the engineer to reject the article. Even the best brands run poorly at times and should be carefully watched to see that the poor qualities are not used in important works where a good price is paid.

Following are some reliable figures for the minimum ultimate tensile strength of good cements.

	<i>In pounds per square inch.</i>	
Mixed neat and allowed to set 24 hours under water.....	Portland, 125; Rosendales, 70	
Mixed with two parts of sand and allowed to set for 7 days under water,	"	25
Mixed with two parts of sand and allowed to set for 28 days under water,		
24 hours under water neat.....	Portland, 125;	" 70
7 days under water, sand 2, cement 1.....	" 130;	" 25
28 days, sand 2, cement 1.....	" 200;	" 60

Those who have seen the great graving docks of England, the enormous hotels of St. Augustine, Fla., the various dams, building and machine foundations which are growing so rapidly in numbers at the present time, and all built of Portland cement concrete, must admit that the construction of the several structures was made possible only by the use of Portland cement as a matrix.

Let us show our professional friends that we know a good thing when we see it, by adopting true hydraulic cement whenever its use is economical, for it will never fail us if properly handled either in concrete work or stone masonry.—*H. F. Bryant, in Mechanical News.*

INSURANCE POINTS.

THE Montana courts have decided that where a company issues a policy on mortgaged property without inquiring whether the property is incumbered or not, the policy having been accepted and paid for in ignorance of the provision making it void, is as effective as if such consent had been indorsed upon it. The company by its act has consented to take the risk under the incumbrance.

A prominent attorney speaking of the question of stipulations in policies regarding prohibited articles said: "Not one agent in twenty understands this. It is generally supposed that the insured himself would be liable for his own negligent acts, but not for those of a stranger or tenant on his property. The courts, however, have well established the rule that where an insurance company has stipulated in its policy that it shall be void if certain things are done or certain prohibited articles are kept on the premises, though these may be brought on by strangers or tenants without the knowledge of the assured, the policy becomes void and the company is discharged from the payment of the claim. In other words, the policy is a contract under certain conditions, and the question whether violated with or without the knowledge of the assured has nothing to do with it. The courts hold that a company has a right to protect itself by stipulation. It cannot watch the property and prevent violation. Indeed, it has not the right to enter upon a man's property for such purpose. On the other hand, there arises an interesting question, should the prohibited articles be brought on a man's premises by thieves or burglars or by force?"

THEN AND NOW.

WE all accept present conditions as matters of course, as if they had always existed. Though familiar with the changes that have come about within a life time, we have adapted ourselves thereto with scarcely a thought of the difference between the old and the new. Even when fondly wanting the good old times and deprecating the new, little thought is given to details; and if called for a bill of particulars, the garrulous elder will have to confess that it is simply a question of superior enjoyment in youth, rather than degeneracy in the present. There can be no question of the wonderful development made in our world during the past forty or fifty years.

A catalogue of the useful inventions and adaptations during this period would make a very large book and this brief article can only refer to a few, such as most affect our daily lives, without attracting a thought, they are so much matters of course-

For instance, who of us think with wonder of the friction match when striking a light? Yet some, and not the oldest of your readers, when thus reminded, will remember the flint and steel which, with pine splints dipped in brimstone, were in use to start the morning fire. Or if, by chance, the tinder, or the so-called matches were out, one of the children was sent to a neighbor's for a shovel of wood coals. Now, and as far back as the present generation can remember, the friction match has been an every-day necessity. And as cheaply as they are sold, thousands of people have been employed in their manufacture, notwithstanding that the use of automatic machinery goes far to displace hands.

Great fortunes have been made on this seemingly insignificant article, and it was a source of large revenue to the government until the repeal of the internal revenue tax a few years ago.

The same older readers will remember when they had to pay twenty-five cents postage on a letter instead of two cents as now, with a prospect of an early reduction to one cent. Then the old wooden pepper-box filled with black sand was used instead of blotting paper, the sheet on which the letter was written folded and addressed, sealed with wax or wafer, the present self-sealing envelope not having been dreamed of, nor the quill pen displaced with steel. If the letters were copied it was by pen, the letter-press and tissue paper letter-book not having yet come in.

Among other little things in which wondrous changes have been wrought,

just think of needles, and pins, and nails. First the advance from hammered to cut and then to steel wire with gimlet point, and, thanks to invention, each improvement in quality is followed by a reduction in price. The same may be said of wood screws which are cheaper now than inferior nails were then.

Regardless of the chronological order in which the little things of domestic use were evolved, the sewing machine has probably effected the greatest revolution, not only in the home, but in the factory. Through the use of the sewing machine and other automatic substitutes for fingers and hands, the old shoemaker, with his proverbial wisdom, has ceased to exist. The hands have simply to attend special machines from which the work is passed on until the finished article is packed for market. This automatic department work which leaves the operator ignorant of preceding or following processes is in use in innumerable other industries; and, while we have boots, shoes, watches, wagons, barrels and other articles of daily need in abundance, and nearly as cheap as the raw material that enters into their construction, we have no more shoemakers, watch-makers, wagon-makers or coopers, but men, boys or even girls, who step in and run machines, whereas, then an apprentice under skilled masters, for three or more years was necessary to learn the trade.

This same sewing machine has, of course, been the chief means of producing ready-made clothing at, it sometimes seems, no more than the cost of the cloth. While it doubtless saves the housewife back-ache and time, it probably has not improved the pay of the poor girls who stitch, stitch for prolonged starvation. Do we have time to think of them when buying garments at the price of cloth?

The changes in farming implements deserve larger mention than space allows. The timely inventions in this line have been of incalculable benefit to mankind, enabling farmers to produce the rapidly increasing amount of food required at reduced cost. Who can say what the conditions would be to-day without these labor-saving machines; certainly wheat would not be selling at sixty-five cents a bushel, nor good flour at three dollars a barrel. Fortunately invention has kept even pace in all directions, preserving an equilibrium under which the farmer is reasonably compensated by the ability to purchase what he requires cheap in proportion, such articles having also been reduced in cost by automatic machinery, subject only, in some cases, to the payment of profits legislated to favored manufacturers under the guise of protection to infant industries—but that is his own look-out. He can force the remedy through his representative in congress if he so desires, but if he still believes it patriotic and profitable to pay tribute to the trusts, to buy in the dearest and sell in the cheapest markets, that is his privilege.

The changes in transportation, traveling facilities and the means of rapid

communication of news, first, through the use of steamboats in place of flat and keel boats, followed by the railroad, telegraph, ocean cable, telephone and electric and cable car lines and elevated railroad. When we think of them at all they leave us wondering how we lived without them. Necessary as all these seem to our daily existence now, we did live without them then, and lived comfortably and contentedly, if tradition is true. We thought Shakspeare was romancing when he made Puck say:

"I'll put a girdle 'round about the earth in forty minutes."

But Cyrus W. Field did it at the bidding of the necessity of the time.

Many of us have almost seen the entire railroad system of the country, vast as it is, built up mile by mile. I well remember when the first railroad was projected east from St. Louis, and with what enthusiastic ceremony the Pacific was started to the far West, following the route of the team trail of the Argonauts of 1849 and 1850. Then from New York to St. Louis was a formidable journey, including canal and river, and occupying about three weeks' time, dependent on whether the Ohio river was low or high. Now you leave New York in a vestibuled train, a parlor on wheels, at 3 o'clock p. m. and arrive here the next day in time for supper.

Then we got our news from across the ocean by sail, followed later by the steamers, until the cable came and gave us the news apparently some hours before the event occurred. Then if we had to send messages from one part of the city to another we had to send a boy or man, and the delay incurred in reply resulted in loss of trade. Now we ring the telephone and receive a reply and conclusions instant. And right here I want to say that the telephone continues to my mind to be the wonder of the age—the idea of talking across miles of busy, noisy streets or to outlying towns, twenty or fifty miles away, is a continual surprise, and the recognition of the voice at the other end of the wire always sets me to thinking. It is always new to me, regardless of the saying that "there is nothing new under the sun," and the assertion in connection with this saying that a means of communication similar to the telephone was in use by the Buddhist priests more than 2,000 years ago, and that they used it between temples long distances apart, in the pretended working of the oracle. All things seem possible except restoration of animal life after death.

Speed now seems to be the great desire. To-day's paper contained a cable, saying:

LONDON, Dec. 16.—J. S. Piza, of Piza & Nephews, New York, has beaten time and the White Star Liner, Teutonic, in a remarkable race. Missing the Dublin mail train for Queenstown, he hired a special and traveled 180 miles in 200 minutes, thus eclipsing the fastest long distance time in England. The Teutonic was starting as he reached Queens-town. He chased it in a special steamer, telegraphed far ahead, caught the liner and got aboard with bag and baggage, while the passengers cheered.

DRAKE FOUNTAIN.

In front of the city hall, one of the New World, stands a bronze figure of Chicago by John B. Drake, and surmounts the fountain. With fitting exercises the fountain dedicatory services were held in the city hall presiding. Thomas B. Bryan made the invocation and Mayor Washburn accepted for the city. Drake was a particularly able one, and expressed the sentiment of every inhabitant of this country.

Mr. Drake conceived the idea of presenting the following description and reference to the City of STONE will give a clear idea of the finest fountain in Chicago.

The fountain is constructed of granite from Bovenno, Italy. The structure is square in plan, measuring by nineteen feet and is thirty-two feet in height. The fountain is composed of three parts. At the angles of the step are semi-circular basins. The second, or platform course, follows the outlines of the first. At the four corners of the platform at the four corners are vases or bowls, which with the molded vases are polished. In each of the four basins arising from the vases are compression faucets. One of the ten faucets is a simple and graceful bronze plug on the sides in raised letters, "Drake Fountain, Chicago." The platform is a chamber which will hold three tons of ice, gradually cooling the water which flows through coils and around the ice. Upon the center of the platform is a massive die, which is built of three solid blocks of granite, one on each side. This part of the structure has a molded cornice, and is supported by two massive sections in single stones with coupled columns. Each face of these blocks is richly paneled and surmounted by a massive capital. At the base of the lower section is a bronze tablet bearing the dedica-

ICE WATER FOUNTAIN.
THE GIFT OF
JOHN B. DRAKE
TO THE
CITY OF CHICAGO,
1892.

On the front of the platform stands a polished pedestal with molded cup and base. On the front of the pedestal die in incised letters is the inscription:

CHRISTOPHER COLUMBUS
THE DISCOVERER OF AMERICA.
1492.

Upon the pedestal stands the bronze statue representing Christopher Columbus, who is represented at the age of about fifty when he had in mind the great voyage of discovery which was the desire of his life. He is bare-headed and wears a belted blouse, with long hose and low shoes. Referring to this period of his life he holds in his left hand a globe. His right hand, holding a pair of dividers, rests easily on his hip. The pose is graceful and pleasing, and is the work of the celebrated sculptor, R. H. Park, of Chicago, formerly of Florence, Italy. The statue was cast in Rome, Italy. An illustration of the fountain appears as a frontispiece in this issue of *STONE*.

THE EQUAL OF ANY.

"I wish to compliment you for the class of journal you are publishing, which I consider the equal of any. I have learned to look for it with about as much anxiety as for 'foundation stone for monuments, etc.'"—*W. A. Hill, Paris, Ky.*

INTERESTING AND INSTRUCTIVE.

"The most interesting and instructive trade magazine we know of."—*Booth & Flinn, Pittsburgh, Pa.*



TRANS-ATLANTIC NOTES.

A MONUMENT in memory of the late Cyrus W. Field has been worked in Kilkenny. It will be shipped from Ireland to America in a few days. It consists of a massive double head stone shaped on top and moulded on the edges. On the front it is ornamented with crossed palm branches surmounted by a Latin cross, all carved in high relief. Beneath is the following inscription:

Cyrus West Field,
Born November 30, 1819.

Married December 2, 1840.

Died July 12, 1892.

Love is imperishable.

On the back of the monument is the following:

Cyrus West Field,
To Whose Courage, Energy and Perseverance the
World Owes the Atlantic Telegraph.

Mary Stone Field,
Born August 28, 1817.

Died November 23, 1891.

The monument is cut out of light bluish-grey, Irish limestone.

Out of the same material the Irish Marble Company are cutting an elaborately carved Celtic cross. It is to serve as a market cross for the Irish village at the Chicago exhibition. This monumental Irish limestone is described as being of uniform texture, close-grained, non-porous, of pleasing color and particularly durable. Some interest attaches to the development of the trade, or, in fact, to any Irish industry, as it is now generally understood that much of the political troubles of that country are caused by too great attention to agricultural pursuits as a means of livelihood. The competition for land in Ireland is now keener than ever; the tenant right often selling for a larger sum than the land-owner's interest. An abundance of ornamental stone is to be found in the country, the working of which would find a much needed outlet for native industry. There are the green serpentine marbles of Connemara; the black and fossil marbles of Kilkenny; the well-known Victoria red; and a marble known as "Sunset," pinkish-grey stone flushed with carmine, yellow and brown in ever-varying tint, perhaps the most beautiful of all.

Nor are the granites of Ireland to be despised, although so few of them are worked. When Irish granite is spoken of one is prone to think of the light blue variety which is quarried at Bessbrook: but away on the west coast, in the wilds of Donegal, there are vast deposits of pink and red granite which are in no way inferior to that produced in Scotland. Not

It sounds like Jules Verne's story of Phineas Fogg's, "Around the World in Eighty Days." A fiction then, several times discounted since by fact, and at least two women, newspaper reporters, and, also, by our only George Francis Train. Will his fiction of "Twenty Thousand Leagues Under the Sea" presently be knocked out by fact? The Detroit torpedo boat seems to have gone far toward it.

Now an electric road is projected from St. Louis to Chicago, to be an exact air line of 250 miles, and the trip to be made in two hours and a half, without stop; and it is not proposed by Jules Verne, but by practical electricians. What is more, it is backed by money, and the work is in progress. The line has been surveyed, right of way acquired; also central coal mines where power-houses are being erected, proving both intention and ability to complete the enterprise, after which it will be pushed to St. Paul and Minneapolis and eastward, if successful. It makes us dizzy to think of breakfast in St. Louis, dinner in Chicago and back home for supper. Then a theatrical company can give a matinee in Chicago and the usual evening entertainment in St. Louis. Balloons are not in it.

The conclusion of a modern engineer, that all things in his line are possible, if backed by plenty of money, seems to be nearly or quite true; and we await with awe the next daring invention, and wonder, as we do with reference to some of those of which we have been writing, will it, or do they benefit man, or would a slower pace leave us in greater average comfort and happiness? Who knows?

Alex. H. Smith.

MONEY-MAKING QUARRIES.

ONE of the heavy yielders, in the stone quarry line, is that owned by Perry, Matthews & Buskirk, northwest of Bedford. They will have shipped 1,500 carloads of stone by the close of the present season. The railroad company gets about \$50 a carload for hauling stone to Chicago, so that this quarry alone will have paid into the Monon's treasury \$75,000 freights. All the good quarries in the county are making money. It is true that the money is being put into machinery and improvements, but it is worth all that it costs in the end. The Adams quarry, which is one of the money-makers, will have shipped about 500 car loads of stone this season, and the Hunter about the same. The empire quarry, located near the Adams, is now in active operation, and will be a paying investment for its owners. The new quarry of Perry, Matthews & Perring, north of town, is being operated, and like all the quarries in that district, it promises grandly.—*Bloomington (Ind.) Progress.*

CHICAGO'S COLUMBUS FOUNTAIN.

ON Washington street, Chicago, in front of the city hall, one of the busiest thoroughfares of the New World, stands a bronze figure of Columbus. It is a gift to Chicago by John B. Drake, and surmounts the fountain bearing his name. With fitting exercises the fountain was unveiled December 26. The dedicatory services were held in the city council chamber, Mayor Washburn presiding. Thomas B. Bryan made the presentation in behalf of Mr. Drake and Mayor Washburn accepted for the city. The presentation address was a particularly able one, and expressed what should be the boast of every inhabitant of this country.

About twenty months ago Mr. Drake conceived the idea of presenting this fountain to the city. The following description and reference to the frontispiece in this issue of *STONE* will give a clear idea of the finest fountain in the city of Chicago.

The material is coral-tinted granite from Boyeno, Italy. The structure occupies a space nineteen by nineteen feet and is thirty-two feet in height. A step course surrounds the fountain. At the angles of the step are semi-circular projections. The second, or platform course, follows the outlines of the step and upon the platform at the four corners are vases or bowls, four feet in diameter, which with the molded vases are polished. In each of the bronze standards arising from the vases are compression faucets. Attached to each of the ten faucets is a simple and graceful bronze drinking cup, having on the sides in raised letters, "Drake Fountain, 1892." Below the platform is a chamber which will hold three tons of ice, effectually cooling the water which flows through coils of pipe below and around the ice. Upon the center of the platform is a molded base, supporting a massive die, which is built of three solid blocks of six to ten tons each. This part of the structure has a molded cornice, above which are two massive sections in single stones with coupled columns at the corners. Each face of these blocks is richly paneled and surmounted by a curved finial.

Over the front of the lower section is a bronze tablet bearing the dedicatory inscription:

ICE WATER FOUNTAIN.
THE GIFT OF
JOHN B. DRAKE
TO THE
CITY OF CHICAGO,
1892.

STONE PRODUCTION—V.*

KENTUCKY.

Sandstone and limestone were produced in this state in 1889. The value of the limestone produced was \$303,314, while that of the sandstone was \$117,940.

Limestone.—The limestone comes from fifty-four quarries scattered over the following counties, named in order of output: Warren, \$128,000; Jefferson, \$76,000; Kenton, \$36,000; Fayette, \$17,300; Pendleton, \$14,000; Lyon, \$7,000, and smaller amounts from Jessamine, Menifee, Logan, Montgomery, Caldwell, Crittenden, Boyd, Marion, Hardin, Washington, Carter and Trigg. The purposes for which the stone was used were mainly for building, to which was devoted an amount valued at \$187,570; \$24,414 is the value of lime produced. To street work an amount valued at \$86,054 was applied. Smaller amounts were used for flux and for bridge work. The product of Warren is deserving of special notice because of its peculiarities and its value as a building stone. This stone is known commercially as Bowling Green oölite. It is quite different from the oölitic stone of Indiana, inasmuch as it belongs to another limestone group, the constituent globules being large and distinct, whereas in most of the Indiana stone they are minute. It is quite similar to the Portland oölite of Ireland. The following analyses of Bowling Green and Portland oölite show the similarity between the two:

COMPOSITION OF BOWLING GREEN, KENTUCKY, LIMESTONE COMPARED WITH
PORTLAND, IRELAND, LIMESTONE.

	Bowling Green. <i>Per cent.</i>	Portland. <i>Per cent.</i>
Carbonate of lime.....	95.31	95.16
Carbonate of magnesia.....	1.12	1.20
Silica.....	1.42	1.20
Water and loss.....	1.76	1.94
Iron and alumina.....	.39	.50
Total.....	100.00	100.00

The quarries are of large extent, well equipped with channeling machines, derricks, etc. A mill with twelve gangs of saws finishes the stone. Blocks of almost any size can be furnished. These quarries were first opened in 1833, but until recently they were operated in the most primitive manner, and while the product has been used chiefly in the South, efforts are now

*Report of United States Geological Survey for 1889-90.

being made to introduce the stone to the building trade of the northern states. Among the cities in which it has been most used are Louisville, Memphis, Nashville, and Bowling Green; to some extent also in Chicago. The stone is soft and easily worked, and like the Indiana stone hardens on exposure to the atmosphere. Carvings made upon the stone stand exposure to the air very well. Its color under the influence of sunlight tends to become continually lighter. Its crushing strength is such as to enable it to resist a pressure of 3,000 pounds to the square inch. When heated to redness on the surface and plunged into cold water it revealed no crack, even upon examination with a magnifying glass, and in some cases on being reheated for a second and third time and plunged into water still failed to present indications of cracking. According to present indications, the extended application of the stone in the northern and eastern portions of the country seems highly probable.

Sandstone.—The sandstone is produced from eleven quarries operated in seven counties of the state, namely: Rowan, \$52,400, Muhlenberg, \$25,000, Lewis, \$24,900, Bell, \$5,000, and smaller amounts from Crittenden, Rockcastle and Ohio. The greater portion of the stone, namely, \$77,877 worth was used for building purposes, \$38,463 for bridge work, and a small quantity for street purposes.

MAINE.

The kinds of stone produced in this state, in order of commercial importance, are granite, limestone, and slate.

Granite.—In the value of granite produced in 1889 this state stood second in the list of all granite-producing states of the Union. The total value of the product was \$2,225,839. The counties producing this product are, in order of their importance: Knox, \$844,638, Hancock, \$685,720, Waldo, \$165,603, Kennebec, \$136,270, Washington, \$106,025, York, \$88,567, Franklin, \$72,033, and smaller amounts in Lincoln, Somerset, Penobscot, Cumberland, Androscoggin and Oxford. From the first seven counties above named comes the great bulk of the entire product. The most productive counties are those along the coast. The value of the granite devoted to building purposes is \$839,125. In the value of stone devoted to this purpose Maine is second only to Massachusetts, but in the value of stone devoted to street work, it stands first among all the granite-producing states, the total value of stone devoted to street work being \$927,949. Of this amount \$824,113 was the value of paving blocks, which were shipped to most of the large cities on the Atlantic coast, principally to New York. Considerable was devoted to cemetery and monumental work. Although Maine doubtless possesses much stone well adapted to these uses, it stands in fourth place among the granite-producing states in the value of output for these purposes, being preceded by Rhode Island, Massachusetts, and Vermont, in

the order named. The vast resources of this state in granite have been utilized to only a small fraction of the possibilities. The quarries situated along the coast have great advantages in the matter of transportation, inasmuch as this is largely by water and freight rates are naturally low. The granite quarries offer very excellent conditions for being worked. The stone opens easily, having peculiar coherent joints that are such striking features of the syenite or granite of New England. Then there are generally at least two of these rift lines and there is a more or less complete division by what appear to be true beds as well as joints, so that the division of the rock is as complete as could be desired. At the same time the lines of weakness are not so numerous as to make the quarried masses in many cases too small for use, as is sometimes true of other regions. Many of the quarries on the coast are conducted on a very large scale with all the latest most improved facilities, not only for quarrying but for the subsequent handling and preparation of the stone for market. A shaft of granite 115 feet long and 10 feet square at the base and weighing 850 tons has recently been quarried. It is claimed to be the largest piece of stone ever quarried. It has not yet been utilized but is lying in the quarry yards at Vinalhaven. The color of the granite produced from quarries in Maine varies from light gray to black and red. From the commercial standpoint the most important are the lightest in color and the gray. The grain of the stone varies very much in size, that quarried at Augusta being quite fine, while the other extreme is seen in the product of the Biddeford quarries. The light-colored stone comes from Biddeford, Pownal, Norway, Lewiston, North Jay, and Augusta. In many cases the light-colored granite is interspersed with black spots of mica which render it unfit for fine work. Veins of quartz, and of quartz and feldspar are often quite troublesome. In many of the ledges, as for example those in Augusta, the stone lies in beds or sheets which are very easily loosened by a single blast. In many of the small quarries the method of quarrying and the tools employed are simple and have undergone little improvement. This, however, is not true of the largest plants for producing this stone. Stone from South Thomaston and St. George is very dark in color and in the latter town are quarries of black stone and the only ones worked to any extent in the western portion of the state. The black granite is largely worked into monuments and it presents very fine contrasts between the black, polished faces and the lighter-colored hammered parts. Quite a large number of small quarries are operated by men whose main occupation is farming, but who work quarries for a small part of the year and with few quarrymen. The usual method in such cases is to secure a few contracts after haying season and they are fulfilled before cold weather. Such firms as these rarely keep any books and it was extremely difficult to determine the exact amount of yearly business done by them.

Limestone.—The limestone of Maine, which is converted entirely into lime, comes for the greater part from Knox county. Smaller quantities are also produced in Waldo and Penobscot counties. In this limestone region there are sixty quarries producing stone which is converted almost on the spot into lime. The total value of the lime product in 1889 was \$1,523,499. The stone is almost inexhaustible in quantity and is admirably adapted to the purpose for which it is used. Operations of quarrying consist simply in blasting by means of dynamite, which breaks the stone up at once into sizes suitable for use in the kilns. It is then hoisted out by means of improved cables and machinery and sent directly to the limekilns, which are favorably situated for transportation by water. The stone is partially crystalline, but very coarse grained. Fine crystals of calcite are very numerous and gypsum also occurs. The operations at the quarries near Rockland are all below the surface of the ground. The fuel used in the kilns is entirely wood, which is imported from Canada. The stone produced for burning into lime is not measured as such, but is measured only by the quantity of lime produced from it, so that in speaking of the amount of stone quarried the producers name the amounts of lime obtained from it, and the unit of measurement is a bushel or barrel of lime. The lime produced at Rockland is of fine character and is the standard lime of New York city, to which it is shipped in enormous quantities. Boston also forms an important market for the product.

Slate.—The slate product of Maine comes entirely from quarries in Piscataquis county. The output in 1889 was valued at \$219,500 for roofing purposes. This slate is of very superior quality.

William C. Day.

[TO BE CONTINUED.]

CERTAINLY THE BEST,

"STONE is certainly the best publication of the kind for our business, in the country, and well worth twice the price of subscription. Would not be without it."—*Fred W. Bandel, Crawfordsville, Ind.*

ONE YEAR WITHOUT, ENOUGH.

"You can send us STONE for one year. We have done without it for a year, but don't want to do so again another year."—*Decatur Stone & Lime Co., Decatur, Ind.*

"ALL IS WELL."



DARK the night, angry the sea,
Wild blew the wind, through shroud and stay.
Watching the waves, under the deckhouse lee,
Wrapped in my rug, I musingly lay.
Our ship struggled strong with the surging wave
As she rose and fell to the storm-king's blast;
And at the giant blows she took and gave
My timid heart cried: "Is this night our last?"
'Mid thoughts of the dear ones far away,
In that quiet home beyond the sea,
The wild wind said: "Fear not, for they
In that far off home are praying for thee;"

While the spray-laden air bore the note of a bell,
And the lookout's cry of "All is well!"
Then my heart beat quick, and all fear fled,
At the words that the wind and bell had said.

And I prayed that my guardian angel might
Through all my course such a lookout keep,
That when life's watch's called—be it day or night,
Be it on the land, or on the deep—
The recording angel may on good deeds dwell,
And close my record with: "All is well!"

—C. A. Smith.

NIAGARA IN HARNESS.

NO engineer ever looked at the spectacle of power displayed by Niagara Falls without a feeling that it was a crime to allow the enormous energy there stored up to run to waste from eternity to eternity. The artist is content to steep his soul in the beauty of the scene, but the average utilitarian American is likely to do some figuring on horse-power and available units of work. The prophecies of years are about to materialize in a great power plan which will utilize 100,000 of the 15,000,000 of horse-power going to waste over the falls, and \$2,500,000 has been expended, and the water wheels will be in place and the sluices will be opened soon. From the early days of the ownership of the falls by the Porter family the advantages of the great water power were freely discussed, but nothing was done until about 1850, when Horace A. Dey caused the construction of a canal, which takes water from a point above the rapids and conducts it to a set of mills built on the banks below the falls and now known as Shoelkopf's mills. The Niagara river makes a bend at a right angle, and the falls are at the apex of that angle. This canal forms the hypotenuse of a right-angled triangle, of which the longest side is the river above and the shortest side is the river below the falls. The mills are near the falls and are not a picturesque feature of the scenery.

The turbines which drive the mills are sunk in pits only about fifty or sixty feet deep, and consequently their tail races discharge a hundred feet or more above the surface of the rapids below the falls, and half of the available power of the water brought down the canal is thus wasted. Less than 6,000 horse-power is utilized. The new works have reversed this plan of a long canal and a short tail-race. They have been constructed on a modification of a plan first proposed by Thomas Duershed, a division engineer of the New York state canals. The plan is to have the mills on the banks above the falls and at a distance from the scenic locality, and then to have a long tunnel to carry the waste water down to the rapids. The mouth of the canal is more than a mile above the falls. As far as constructed the canal is about 1,500-feet long, twelve feet deep, and varies from a breadth of 200 feet at the mouth to 100 feet at its inner end. Along the sides of this canal and of its branches to be built are sunk pits to a depth of 160 feet, and at the bottom of these pits are placed the turbine water wheels. Each of these wheels has 140 feet effective head of water over it. The water is carried down to them in great pipes seven or eight feet in diameter. After

the water has done its work on the wheels it is discharged into the big tunnel, which runs away underground to the river below the falls.

This tunnel has been the most difficult and costly part of the work so far. It was cut through solid limestone rock, but the rock was found to crumble so badly after exposure that the whole 7,000 feet of tunnel had to be bricked up. It is in form of a horseshoe, twenty-eight feet high and eighteen feet broad, inside dimensions. Starting at a depth of 160 feet it has a downward slope or pitch of four feet in a thousand at first, increasing to seven feet in a thousand. Its mouth where it discharges into the rapids is 214 feet below the brink of the cliffs which form the ravine. Its cross section is 365 square feet, and at the speed of twenty feet a second, with which the water will rush out of it, there will be a discharge of about 50,000 gallons per minute. And yet this enormous amount of water will not show any appreciable drain whatever on the magnificent volume of Niagara. It will lower the level of the great flood only about one and one-half inches. The extent and constancy of this water power can be understood when it is realized that the water service of the great lakes, with the land sloping into them and contributing to the falls of Niagara, has a total drainage basin of 240,000 square miles—equal to more than twice the area of Great Britain and Ireland, about 40,000 square miles more than the total area of France, and more than fifteen times the total of Switzerland. The Horseshoe falls are 158 feet high and 2,000 feet wide. The other channel, in the state of New York, forms the American falls, which are 169 feet high at the eastern side, and 1,000 feet wide, both falls comprising 3,600 linear feet of water.

The extreme limits of variation in the depth of the river at different times above the falls are three and one-half feet, but these limits are rarely reached. The ordinary variation is about one foot. Below the falls the extreme variation reaches fifteen feet. Generally a variation of one foot above the falls is followed by a change of level of five feet below the falls. These slight changes are of short duration, and are due mainly to long continued and violent wind or sudden great accumulations of ice. The average discharge of water at the outlet of Lake Erie into the Niagara river is estimated by some authorities at 265,000 cubic feet a second. Moreover, as far as this or the next two generations are concerned, it doesn't matter whether there is any rain-fall, for there are 6,000 cubic miles of water backed up in the little mill pond of the Niagara Falls Power Company, which is sufficient to run the falls in their present style without the help of another drop from the clouds.—*New York Tribune*.

PILE DRIVING.

A FALLING body cannot do more work when its progress is arrested than has been done on it in lifting it up to the height from which it has fallen. This is a fundamental and unalterable principle. Thus, for example, let us suppose that the ram of a pile driver weighs one ton, and that it falls four feet onto the head of a pile; then the work in the ram cannot be either more or less than that which is equivalent to four-foot tons. Thus, the work in the ram at the moment it touched the head of the pile would be sufficient to raise the ram up again to the point from which it fell; or to raise a weight of four tons to a height of one foot; or to raise one pound through a height of 8,960 feet; or to raise forty-eight tons through a height of one inch. Now, it is clear that if the ram were employed to raise one ton through a height of four feet, it must exert a force of one ton throughout the distance of four feet. If it did not, it would not move one ton at all, for it would be overbalanced. If it were called upon to raise four tons through a height of one foot, then it must exert a push of four tons through a distance of one foot; if to lift a weight of forty-eight tons, then it must exert a push of forty-eight tons through the distance of one inch, and so on.

Bearing this in mind, there will be no difficulty in understanding the following simple rule: The force of a blow is measured by dividing the whole distance passed through by the ram before impact by the distance passed through after impact, and multiplying the weight by the quotient. Thus, let the ram weigh one ton, let the fall be forty-eight inches, let the pile descend one inch at each blow, then the push or effort exerted by the ram on the top of the pile will be $W = 48 \times 1 = 48$ tons. It must be understood that this is the mean or average force of the blow. Its initial effort may be much greater and its terminal effort much less, because at the instant of impact the ram is moving at its full velocity, while at the instant the pile ceases to descend it will have no motion at all, and consequently will exert no push, except that due to its weight.

Three factors are in all cases necessary, namely, the weight, the height of fall, and the distance through which the body which receives the blow moves. In practice it is by no means easy to ascertain the latter with precision; and the energy in the falling body can be expended in more ways than one. For example, when the head of a pile is struck, two effects take place simultaneously, the ram is shortened and so is the pile. The

elastic rebound of each immediately takes place, and the ram jumps up from the top of the pile. Again, the top of the pile becomes highly heated. The elasticity of the pile plays an important part in influencing the rate of its descent. A ram weighing 100 pounds, falling a height of fifty feet, will have stored in it on impact 5,000 pounds, and if the progress of the pile were one inch, its driving force would be 60,000 pounds. A ram weighing 1,000 pounds and falling five feet, would also have 5,000 foot pounds of work in it, and would exert a driving force of 60,000 pounds over a space of one inch; but it does not follow that the former would be equally effective in driving the pile. On the contrary, the lighter ram striking the pile with a higher velocity might be much the less efficient of the two, because the force of the blow would not be transmitted through the pile, but would be expended in compressing the top of it. When a pile is struck on the top, what is known as a wave of compression passes through it; and this wave requires time for its passage. Such a wave is set up in all columns when stress is suddenly brought on one end. The effect of a heavy ram falling a short distance on a pile head resembles a push, in a sense, and gives time for the transmission of the effort throughout the whole pile, but when a light ram falls the effect may be confined to the top of the pile, which is shattered.

The velocity with which a ram strikes a pile head is calculated by the extracting of the square root of the height of fall in feet and multiplying it by eight. Thus, let the ram fall four feet; the velocity will be sixteen feet per second. If the ram falls fifty feet it would strike the pile with a velocity of fifty-six feet per second. If this speed was greater than that at which the wave of transmission could pass through the pile, then little or no effect would be produced in the way of causing its descent; as nearly the whole of the work would be done in compressing the top of the pile, or in shattering it, and the driving effect would be nothing. The effect of the element of time is not sufficiently well understood. About the only thing fully understood or accepted is that a heavy ram falling from a moderate height is, other things being equal, much more efficient than a light ram falling from a great height.—*The Mechanical News.*



BRIDGE BUILDING IN AMERICA.

BRIDGE-BUILDING has become one of the exact sciences only within the last twenty or thirty years. The earlier bridges—wooden of course—were built largely by "judgment." First, every stick from one end to the other was made of the same-sized timber, and when one member of a bridge failed that part was replaced by a larger piece, and so on until every part had been made sufficiently strong. Squire Whipple, who was the first to analyze the strains in bridges, published the results in 1847, but his work did not become generally known until a much later date.

Many of our earlier bridge engineers, from Timothy Palmer, Theodore Burr, Louis Wernwag and others, down to the era of iron bridges, showed their genius in the structures they left behind them, some of which have stood the demands of traffic for more than a hundred years. It should be remembered that it is customary now to consider the life of a wooden bridge as only from seven to ten years. One reason the earlier bridges lasted so much longer was the care with which the timber was selected and seasoned before use. Wernwag had all his timber sawed through the heart to detect unsound wood, and never used timber thicker than six inches. The bridges were first wooden trestles, then trusses and arches and combinations of the latter two. Wood and iron bridges in time became very popular, especially in the form of the Howe truss. The Pratt truss never came into general use as a combination bridge. Cast-iron bridges, fortunately, never obtained the same footing here as in England, but there are still a good many to be seen.

When iron bridges came into use, the "cut and try" method of designing was of course too expensive, and engineers began to calculate the exact strains in every portion of a bridge. Such men as Squire Whipple, J. H. Linville, George E. Gray, Albert Fink, Bolman and others had uphill work, making their own original designs without any literature or precedent to furnish suggestions. Now any school-boy can find the subject written up within his comprehension, without having to surmount any of the difficulties experienced by our pioneer bridge builders. A few years ago a casual glance at a bridge was sufficient to tell the name of the designer and builder. The designs have been gradually improved, however, until no one man can claim credit for our best designs, the form and style depending more on the requirements than on the taste of the engineer.

In this country the best practice in bridge building is to use eye-beams

for spans up to eighteen feet; plate girders for spans eighteen to eighty or even 100 feet; lattice or open-riveted girders from the last limit to 120 feet; pin-connected trusses to 550 feet; cantilevers from this limit to a span somewhere between 1,000 and 1,500 feet; after which economy requires suspension bridges. Continuous girders, or bridges connected or made continuous over two or more spans, have gone out of favor owing to the ambiguity of the strains, the least settlement of a pier rendering the strains uncertain. Of course where these bridges are built they are provided with adjustable shoes, so that if the piers settle the bridge can be raised, but this requires great watchfulness. The above limits are necessarily subject to change, owing to local circumstances, such as the difficulties of erection, etc. For instance, in the Lachine bridge, where the St. Lawrence river made false work out of the question, the two channel spans of 408 feet each, were built as cantilevers, but turned into continuous girders when coupled up or completed.

Although the principle of the cantilever has been known for ages, it has only recently been adopted for long-span bridges; first by the late C. Shaler Smith, of St. Louis, and Mr. C. C. Schneider, chief engineer of the large bridge companies. The latter designed the Niagara and Fraser river cantilevers. One of the earliest iron bridges built in England was the tubular—a box tunnel made of wrought-iron plates and angles—the first of this type being the bridge over the Menai straits in Wales. The only important one built on this continent is the Victoria bridge at Montreal. In recent years a greater part of the top of the Victoria bridge and a considerable portion of the sides have been removed. This permits the smoke from trains to escape and really strengthens the bridge, as it has removed a considerable amount of dead weight. While tubular bridges are not now built, they certainly were wonderful in their day for ingenuity and boldness.

The greatest cantilever ever constructed is the Forth bridge, with 1,700 feet clear span, while our East river suspension bridge is the next greatest bridge. The bridge designed by Mr. Lindenthal, a sixteen-track suspension having a clear span of 2,800 feet, over the North river, will throw these into the shade. Work on this gigantic structure will probably be begun soon. The writer has made plans and estimates for a six-track cantilever over the East river, with spans of 1,100 feet. While we cannot but admire the Forth bridge, it is not likely that it will ever be reproduced in this country, though anyone who attempts to design an equally strong cantilever of the same span and strength with less material will find his respect for the Forth much increased. By using rectangular sections instead of circular, and pin connections instead of rivets, we could erect a bridge in very much less time.

Considering the ignorance on the part of many bright architects and railroad engineers of the simplest principles of bridge-designing, it is

really wonderful that there are no more failures. To take only two cases: A young architect who has just won the first prize for the design of a 250-foot roof made the surprising statement that he knew nothing of strains, and that, while he would like to make a study of the subject, he was "obliged to take up the more important branches first." The other case is that of a chief engineer who tried to design a through bridge by turning a deck bridge upside down.

To show that the strains are the same whether applied at the top or the bottom of the bridge, suppose we have a timber beam resting on two supports and then apply a very heavy load either to the top or bottom of the beam. Either position of the load will cause the beam to deflect, and this deflection will necessarily shorten the top of the beam (that is, compress it) and lengthen the bottom. We have then compression in the top of the beam and tension in the bottom. This applies to all bridges resting equally on two supports. The knowledge of this simple fact would have saved a number of disasters. The writer once saw a letter from an excellent engineer, who, however, attempted to build a bridge without the theory and then reported that "the bridge at this creek was swung at 2 o'clock and then failed." His error lay in putting his compression joint in the bottom chord, where, as we have seen, he required a tension joint.

Many of our capable railroad chief engineers prefer to let the bridge companies design their own bridges, but no one is really competent to check a design unless he can first make one. An ideal training for a graduate of a technical school would be to spend a year or so in the draughting-room of a bridge company, go into the shop for a few months, and also out on the erection of bridges. If he should then spend some time in the designing office of both a bridge company and a railroad, he ought to be able to design a good bridge. If he has omitted any of these steps, he will always have, or give, more or less trouble. The engineer of a railroad and the engineer of a bridge company have often two distinct objects in view, the first being governed by local conditions of streams, grades, etc., and the latter by economy of shop practice. The man who has served in both capacities can design the best bridge for the least money. A fallacy far too common is the supposition that anybody can enforce the specification for a bridge. The necessary specifications for an expert could be put on one sheet of paper, but they could not be made long enough for an inexperienced man.—*T. Kennard Thompson, C. E., in Engineering Magazine.*

POINTS ON SELECTING MONUMENTAL STOCK.

SELECTING monumental stock may be done right or wrong, depending upon the knowledge of the buyer and the honesty of the man with whom he is dealing. The unscrupulous dealer has, therefore, almost unlimited opportunity to cheat the buyer. There are, too, dealers in stone who know very little about selecting stock for monuments, so it may be said to be almost a matter of chance or favorable opportunity which gives one a really good monument.

It is seldom that a customer specifies from what quarry a stone for his monument shall come, merely giving a general order for a certain color of marble, granite or other stone of which he wants his monument carved. Much is, therefore, left for the manufacturer. Fortunately there is a great variety of all classes of stock to select from. Tastes differ in the stone-yard also, and the consequence is all quarries have their customers. The difference is so slight in stone quarried in one locality that few customers can distinguish and not all manufacturers are thoroughly posted on the matter so that they can tell by outside appearances from what quarry a stone was taken.

In selecting, a dealer has to look out for knots and streaks, those black and white spots in granite which are not mixed even, and imperfections of different character in other varieties of stone. Such imperfections are rare in good stock, but a dealer has to be constantly on the lookout for even the smallest imperfections. Those little red spots in granite cause rust spots in time. Some unprincipled dealers apply muriatic acid to such spots, causing them to fade for months, and sometimes for years, but eventually to appear again and ruin the looks of the monument. If a granite monument in the rough is suspected of imperfections, a thorough wetting will cause any of them to show, settling the question as effectually as years of weathering.

For hammered granite work, light stock is used principally, as it costs less and works finely. It comes from the "sheet" quarries which are easier to work than the "boulder" quarries. Nearly all of the bottom bases come from this grade, but for polishing something darker is sought, and stone from the boulder quarries is generally selected. A greater variety is found than in the other grade, and more care is necessary in selecting. When only one band is to be polished for raised letters, medium will answer, but for dies and caps the very best dark must be selected. Very few customers ask for an entire monument of medium granite.

Henry C. Nye.



THE STRENGTH AND WEATHERING QUALITIES OF ROOFING SLATES.

AT the September meeting of the American Society of Civil Engineers, in New York, Mansfield Merriman presented a very interesting and instructive paper on the strength and weathering qualities of roofing slates. The paper begins with a brief description of the geological position of the slate beds and the methods of quarrying and manufacture. The purpose of investigation was, however, "to experiment as closely as possible upon those properties which are called into service in resisting the stresses to which they (the slates) are subject, and upon those qualities which either assist or resist the disintegrating action of the atmosphere and weather." The main points considered were (1) strength and toughness; (2) porosity; (3) density; (4) hardness, and (5) corrodibility. The materials tested were the well known roofing slates of Pen Argyle and Bangor, in Pennsylvania.

The test of strength was made upon pieces twenty-four inches long by twelve inches wide and from three-sixteenths of an inch to one-fourth of an inch in thickness. These were supported in a horizontal position upon wooden knife edges twenty-two inches apart, the loads being applied upon another knife edge placed half way between the supports. The results thus obtained are given in the accompanying table. This same series of tests furnished a means of determining the toughness, or elasticity of the slates and furnished the data given in the third column of the tables. The specific gravity or density was obtained in the usual way and needs no further mention here. The softness or capacity for abrasion was ascertained by grinding weighed pieces, under constant pressure, upon a grindstone during a certain number of revolutions, and then reweighing to ascertain the loss. This treatment gave the results in column five. The porosity or absorptive power was ascertained by immersing in water for twenty-four hours specimens previously dried at a temperature of 135 degrees Fahren-

heit, and noting the increase in weight. The sixth and last test, that of corrosion by acids, was made by immersing weighed pieces of the slate in a solution consisting of ninety-eight parts water, one part hydrochloric and one part sulphuric acid. The loss in weight, computed in percentage, is given in the sixth and last column.

TABLE A.—TESTS OF ALBION SLATES.

Mark of the Specimens.	STRENGTH.	TOUGHNESS.	DENSITY.	SOFTNESS.	POROSITY.	CORRODIBILITY.
	Modulus of rupture in pounds per square inch.	Ultimate deflection, in inches, on supports 22 inches apart.	Specific gravity.	Amount in grains, abraded by 50 turns of a small grindstone.	Per cent. of water absorbed in 24 hours.	Per cent. of weight lost in 63 hours in acid solution.
A 1.....	6 920	0.25	2.770	86	0.238	0.588
A 2.....	7 560	0.31	2.775	97	0.219	0.619
A 3.....	6 230	0.25	2.782	65	0.171	0.500
A 4.....	7 330	0.34	2.761	76	0.259	0.614
A 5.....	6 920	0.31	2.781	86	0.303	.....
A 6.....	7 130	0.25	2.775	86	0.274	.....
A 7.....	9 110	0.31	2.781	86	0.246	.....
A 8.....	6 220	0.22	2.775	76	0.197	.....
A 9.....	7 565	0.26	2.764	65	0.263	0.616
A 10.....	7 845	0.30	2.765	86	0.228	0.508
A 11.....	6 930	0.22	2.781	86	0.232	0.491
A 12.....	6 080	0.22	2.785	65	0.228	0.438
Means.	7 150	0.270	2.775	80	0.238	0.547

TABLE B.—TESTS OF OLD BANGOR SLATES.

Mark of the Specimens.	STRENGTH.	TOUGHNESS.	DENSITY.	SOFTNESS.	POROSITY.	CORRODIBILITY.
	Modulus of rupture in pounds per square inch.	Ultimate deflection, in inches, on supports 22 inches apart.	Specific gravity.	Amount in grains, abraded by 50 turns of a small grindstone.	Per cent. of water absorbed in 24 hours.	Per cent. of weight lost in 63 hours in acid solution.
B 1.....	11 550	0.32	2.816	151	0.131	0.410
B 2.....	11 540	0.38	2.807	140	0.170	.....
B 3.....	9 740	0.31	2.795	76	0.099	0.439
B 4.....	8 650	0.31	2.784	119	0.127	0.481
B 5.....	7 280	0.25	2.779	86	0.204	.....
B 6.....	9 220	0.31	2.759	130	0.174	0.374
B 7.....	8 440	0.27	2.776	119	0.167	.....
B 8.....	11 570	0.40	2.769	130	0.123	0.551
B 9.....	10 215	0.32	2.782	173	0.123	0.464
B 10.....	10 900	0.37	2.767	86	0.169	.....
B 11.....	8 120	0.23	2.769	140	0.099	0.404
B 12.....	10 490	0.32	2.754	184	0.152	.....
Means.	9 810	0.312	2.780	128	0.145	0.446

TABLE C.—MEAN RESULTS OF PHYSICAL TESTS.

Property.	Measured by—	Albion slates.	Old Bang'r slates.	Mean of both.
Strength....	Modulus of rupture, in pounds per square inch.....	7 150	9 810	8 480
Toughness..	Ultimate deflection, in inches, on supports 22 inches apart.....	0.270	0.313	0.291
Density.....	Specific gravity.....	2.775	2.780	2.777
Softness....	Weight, in grains, abraded on grindstone under the stated conditions.....	80	128	104
Porosity....	Per cent. of water absorbed in 24 hours, when thoroughly dried.....	0.238	0.145	0.191
Corrodibility	Per cent. of weight lost in acid solution in 63 hours.....	0.547	0.446	0.496

Discussing the results Mr. Merriman calls attention to the fact that as shown in table C. "the different qualities are connected by definite relations, the strongest slate being the toughest and softest, as also the least porous and corrodible." The fact that the softer slates proved the strongest, is commented on as unexpected, though the present writer can scarcely so consider it, since hardness is in many articles, both natural and artificial, accompanied by a corresponding brittleness. The rule has, however, many exceptions. The test for transverse strength is regarded by Mr. Merriman as the most important of all, and the most satisfactory, if but a single one is to be made. In but two instances were chemical analysis resorted to, owing to the fact that the interpretation of such analysis "is, at best, imperfect and unsatisfactory." Below are given the results obtained, such elements being determined "as would probably afford indications, first, of its valuable qualities, and secondly, of its injurious constituents."

	Albion.	Old Bangor.
Silica (Si O.).....	55.18	56.97
Oxides of iron and aluminum (Fe. O. Al. O.).....	25.57	26.05
Carbonic acid (C. O.) and organic matter.....	8.36	7.14
Oxide of calcium (Ca. O.) or lime.....	4.09	4.38
Oxide of magnesium (Mg. O).....	2.10	2.69
Sulphur (S).....	0.700	0.462
Oxides of sodium and potassium (by difference).....	4.00	2.31

Manganese is present in all the slates.

The valuable constituents as shown by these analyses are the silicates of iron and alumina of which calculation shows the Albion slate to contain 80.75 per cent. and that of Bangor 83.02 per cent. The injurious constituents are lime and magnesia in the form of carbonates and sulphur in the form of iron pyrites, the first mentioned being liable to removal by solution and the pyrite objectionable owing to its tendency to oxidation. A calculation of the relative proportions of the carbonates gave results as follows:

	Albion.	Old Bangor.
Carbonate of lime.....	7.40 per cent.	7.82 per cent.
Carbonate of magnesia.....	4.41 " "	5.65 " "
Total carbonates.....	11.71 per cent.	13.47 per cent.

The general conclusions reached in the series of tests is summarized as follows;

"1. Slates containing soft ribbons are, by common consent, of an inferior quality, and should not be used in good work.

2. The soft roofing slates weigh about 173 pounds per cubic foot, and the best qualities have a modulus of rupture of from 7,000 to 10,000 pounds per square inch.

3. The stronger the slate, the greater is its toughness and softness, and the less is its porosity and corrodibility.

4. Softness, or liability to abrasion, does not indicate inferior roofing slate, but on the contrary it is an indication of strength and good weathering qualities.

5. The strongest slate stands highest in weathering qualities, so that a flexural test affords an excellent index of all its properties, particularly if the ultimate deflection and the manner of rupture be noted.

6. The strongest and best slate has the highest percentage of silicates of iron and aluminum, but is not necessarily the lowest in carbonates of lime and magnesia.

7. Chemical analyses give only imperfect conclusions regarding the weathering qualities of slate, and they do not satisfactorily explain the physical properties.

8. Architects and engineers who write specifications for roofing slate will probably obtain a more satisfactory quality if they insert requirements for a flexural test to be made on several specimens picked at random out of each lot.

9. Although the field of this investigation is probably not sufficiently extended to fully warrant the recommendation, it is suggested that such specifications should require roofing slates to have a modulus of rupture, as determined by the flexural test, greater than 7,000 pounds per square inch."

The tests as above reviewed are of more than usual interest, and it is to be hoped that Mr. Merriman may be able to continue his work with reference to slates from other localities. There are, however, a few additional points which it seems to the present writer, should be considered. The first of these is the matter of color. Many roofing slates become faded and dingy on prolonged exposure. In the blue-black varieties the coloring

matter is ordinarily assumed to be some form of carbon. If so, the change in the hue may be due to the bleaching out of this constituent. Chemical tests to ascertain the percentages of carbon would, therefore, be of value, as would also tests made with acid fumes or long continued heat. The tests of corrosion and strength could be made of still greater value if they could be combined, i. e., if the specimens first tested for corrosion could be subsequently tested for strength and the results thus obtained compared with those obtained on the fresh material. The method of calculating the analyses, as given, is not quite safe. A portion of the carbonic acid (C. O. 2) obtained may be from the carbon compounds and not from the lime and magnesian carbonates, while on the other hand a portion of the lime and magnesia may exist, not as deleterious free carbonates, but as combined silicates (mica or felspars) which are in no way objectionable. In this connection a microscopic examination of the slate in thin sections would prove of value. As Mr. Merriman himself has implied, the usual interpretation of chemical analyses is unsatisfactory. We want to know, not merely what are the constituents of a stone, but the form in which those constituents are combined. This knowledge can be best obtained by the microscopic method, though even this fails at times.

George P. Merrill.

GRANITE IN EGYPT.

THE ancient Egyptians watched the effect of atmospheric and other influences on stones, and wisely profited by the lessons taught them by experience. They learned that earth abounding with niter, from its attracting moisture, had the effect of decomposing granite, but that in the dry climate of Upper Egypt the stone remained for ages uninjured when raised above all contact with the ground. When therefore there was a possibility of its being exposed to damp, they based an obelisk or other granite monument on limestone substructions, and these last are found at the present day perfectly preserved while the granite above them gives signs of decay in proportion to its contact to the earth subsequently accumulated around it. This refers to Upper Egypt, visited only four or five times in a year by a shower of rain, for in the Delta granite remains have been affected in a far greater degree than in the Thebaid; niter abounds there, and it is remarkable that the obelisks at Alexandria have suffered the least on the sides next the sea. The Egyptians seldom used granite as a building stone, except for a small sanctuary in some sandstone temple; and in the later times of the Ptolemies one or two temples were built entirely of granite. But in the true Egyptian period the use of that stone was chiefly confined to the external and internal casing of walls, to obelisks, doorways, monolithic

shrines, sarcophagi, statues, small columns and monuments of limited size, and was sometimes employed for roofing a chamber in a tomb. The durability of granite varies according to its quality. The felspar is the first of its component parts which decomposes, and its greater or less aptitude for decay depends on the nature of the base of which the felspar consists. Egypt produces a great variety of granite, and the primitive ranges in the desert east of the Nile, about thirty-five miles from the Red sea, supplied the Romans with numerous hitherto unknown kinds, as well as with porphyry, which they quarried extensively in that district; but the granite of the ancient Egyptians came from the quarries of Syene, in the valley of the Nile, and from these they obtained what was used for their monuments. It is from this locality that the name of "Syenite" has been applied to a certain kind of granite; it is, however, far from being all of the same nature, and a small portion only of the stone found there is really what we now call "Syenite." Already, at the early period of the third and fourth dynasties, between twelve and thirteen centuries before the Christian era, the Egyptians extensively employed granite for various purposes. They had learned to cut it with such skill that the joints of the blocks were fitted with the utmost precision; deep grooves were formed in the hard stone with evident facility, and it must have been known to them for a long period before the erection of the oldest monuments that remain, the Pyramids of Memphis, where granite was introduced in a manner which could only result from long experience. Again, in the time of the first Osirtasen, about 2,050 years before the Christian era, granite obelisks were erected at Heliopolis and in the Fyoom, and other granite monuments were raised in the same reign at Thebes, from which we find that even then the Egyptians had learned how the damp earth acted on granite when buried beneath it; and this interesting question consequently suggests itself: How long before that time must the stone have been used to enable them to obtain from experience that important hint which led them to place granite on limestone substructions? —*The Architect, London.*

BRIEFLY AND HONESTLY.

"We're highly pleased with the magazine and briefly and honestly, we think it the best published. While other papers cost more, yours is by far the most valuable for quality of reading matter."—*Killbuck Brownstone Co., Killbuck, Ohio.*

DYNAMITE AND ITS USE.

DURING the month of December the daily papers throughout the country chronicled an unusual number of accidents, such as loss of property and life, by premature explosions of dynamite. This explosive is very sensitive to the cold and congeals readily at a temperature of thirty-five to forty degrees. Being non-explosive when frozen, the liability to accidents is increased during the winter months. These explosions having become an almost weekly occurrence, it is fair to assume that the average quarryman should take warning and profit by the sad experience of others. The suggestions and the instances that I shall mention in this article are of my own practical experience, which has been of seven or eight years duration in the handling of dynamite. This explosive when used in taking off top rock, or blasting out worthless stone, expedites labor and materially reduces the cost of quarrying. It is never employed in taking out stock either in the slate or marble sections. It is customary in limestone ledges to use dynamite in making the first blast, or what is generally known as a "starter." The second blast being made with blasting powder. This method of quarrying has its objections. It is an established fact that the actual results of any blast is dependent entirely upon the confinement of the volume of gas which is created whenever the explosive is fired. The greater the density of the gas, and the closer it is confined, the better the results sure to follow. In the second blast a large percentage of this gas is lost in the cracks and seams made by the previous blast. Among the slate quarries it is necessary quite often to take off the top, which is comprised of flint rock and mongrel slate, that will vary in thickness from twenty-five to forty feet. Some quarrymen will in this way spend several thousands of dollars before any income is realized at all. So, then, dynamite and the steam drill as economizers of time and money, are absolutely necessary.

It is too frequently the custom in many quarries to assign the handling of the explosives to a laborer, who takes pride in seeing how careless he can be while making a blast, or thawing the frozen cartridges. They will go to the blacksmith shop and thaw several cartridges over the forge and then place them in their bootlegs in order to keep them warm, and in this way go about the quarry and resume their labor until they make the blast. Dynamite, like other merchantable commodities, has its inferior or low-priced goods. The quality is frequently reduced in order to conform to low prices

and competition, and quite a large share of accidents are the direct results of making this class of goods.

There are reliable companies who have transacted business in high explosives for years, who have never met with an accident, while there are other companies who are always unfortunate, and are continually meeting with losses of this kind. Accidents are liable to occur in the handling of the very best of dynamite, and to come occasionally from an unlooked-for source. At one time it was the practice in a certain quarry, (it isn't now,) to thaw the dynamite in a pail of hot water. The dynamite cartridges were placed in the pail while the process of heating was going on: the nitro-glycerine would flow out of the cartridge and fall to the bottom of the pail. If it became necessary to warm the water, it was done by heating a large piece of iron and throwing it into the pail. This practice was continued until one day Mr. Smithey was suddenly called upon to take his departure through the side of the blacksmith shop. The roof of the building sailed off in another direction; while the tools and other appliances used about the shop were distributed in liberal quantities about the neighboring fields. The blacksmith who heated the iron and threw it into the pail, the bottom of the pail containing a sufficient quantity of the nitro-glycerine to cause the explosion, is alive at present writing, and has no desire to pass through a similar experience. Since this occurrence different methods are employed in thawing dynamite at this particular quarry.

In another instance the man who handled dynamite at a certain quarry brought a fifty-pound case into the building and placed one-half of it to thaw on the fire-box below the boiler, the cartridges standing on one end on the box and the other resting against the bottom of the boiler where they became overheated. The explosion which followed was a surprise party. When the order came for this man to step down and out there was no hesitation or mental reservation on his part. He left on the first impulse. His departure was as sudden and as swift as the wings of the morning, or the flight of a bank cashier to some foreign country. His friends found him after the explosion deposited in the top of a tree several rods distant, and soleless so far as his boots were concerned. His overcoat was torn into shreds and the building he occupied into splinters. He was unacquainted with his fellow workmen who came to his rescue. His surroundings were strangely different from the familiar scenes that he knew so well but a moment before. Disorder, ruin, devastation and chaos reigned supreme. It was no wonder that he thought himself in some strange land. The explosion tore large limbs from trees that were close to the building. It shook houses and rattled windows in the village of Fairhaven, Vt., three miles distant. It stirred up districts and communities for miles about. Timid women believed it to be the sound of the last trump, while men with chat-

tering teeth pronounced it to be an earthquake, gotten up for this special occasion, of gigantic proportions. This man who thus rattled the bones of both enemy and friend, who run ahead of time on his aerial voyage, is alive to-day but his convictions in regard to the destructive force of dynamite is lasting and permanent,

The most approved plan of thawing dynamite, one that is attended with the least danger and at the same time the most economical, is the method commonly known as dry heat. Two cylinders of tin are made, one being much smaller than the other, so that the smaller one will set inside the larger, leaving between the two one-fourth of an inch space. Each cylinder has a tight cover and the inner cylinder is perfectly dry and contains the dynamite. Hot water is placed between the two cylinders and is allowed to remain there until the cartridges become soft, when they are ready for the blast. Previous to placing the dynamite in the holes that are to be fired, it is necessary that they remain long enough in the dry cylinder so that they will be thoroughly thawed.

"The unexpected always occurs" whenever an accident takes place, whether it is caused by the premature explosion of dynamite or ordinary blasting powder. Last September Capt. Jones, who was one of the proprietors of the New Empire Slate Company, Poultney, Vt., was killed while opening a keg of blasting powder. Mr. Jones was one of the very best quarrymen in the slate belt of Vermont, having had an experience of twenty-five years. It is probable that he had opened during this time several hundred kegs of powder in the same manner that he did the last one, namely, with a cold chisel and hammer. The keg was of iron. The two metals coming together created a spark which ignited the powder, resulting in the fatality mentioned. This accident could have been prevented if the powder had been placed in a wooden package instead of iron.

Individual members of the last session of the Vermont legislature were requested to remedy this evil by passing a law which would prohibit the importation of blasting powder into the state otherwise than in wooden kegs. No attention was paid to this request, which might have been the means of saving many a life. These, the late lamented law-makers, deemed it a matter of the greatest importance to spend several thousand dollars of the state's money in passing a dog law. The sum thus expended was in excess of the actual value of all the dogs in the state. Conventions which are prolific in discussions are being held in the interest of quarrymen in different sections of the country. The importance of these meetings and the profit derived from them are of an incalculable benefit to the producers. Although discussion of something, however, which would tend to lessen the danger that constantly menaces the average quarryman, has not been made manifest. Carelessness and the neglect of a proper observance of danger

in the handling of high explosives in and about a quarry, are as reprehensible to the employer as it is to the laborer. It is the duty of the former to observe closely that his orders requiring the greatest caution are faithfully executed.

The rank and file of the men who are engaged in quarrying stone are among the brightest and most intelligent of any class of people. A thoroughly equipped quarry with all the modern mechanical appliances is a sufficient evidence that the skill and ingenuity of the mind of man has been of great importance in devising labor-saving machines, which become necessary, on account of the close competition that exists in every branch of the trade. With such a class of people to deal with, "an ounce of prevention" is of more value than several pounds of cure. On the contrary, nearly every community is cursed with a physical sediment of sentimentality, who drag out an existence in smoking cigarettes and verging on the narrow limits of nothingness. This infinitesimal is always found among that class of people who are continually pointing a gun at some companion and when they have ascertained that their efforts have produced fatal results, resort to the chronic excuse, "that they didn't know it was loaded." High explosives are always loaded, so that it is absolutely necessary that every person who has occasion to handle them should always exercise the greatest care, and avoid danger as much as possible.

Geo. H. Harris.

THE BEST IN AMERICA.

"Please permit me to congratulate you in the good taste you have for remodeling. STONE is beyond doubt the best authority that has ever come before the people. This fact will be demonstrated by the great circulation that is in the near future for it."—*S. J. Reed, Mgr. Roanoke Black Marble Works, Houston Mines, Va.*

"I should like to subscribe for STONE, beginning with the first number of Vol. 5, providing you have the back numbers in question. In my line it is very necessary to have your very instructive journal."—*E. P. Coulman, Albuquerque, N. Mexico.*

"I have been very much pleased with STONE for the past year. I find it very interesting, as it gives all the latest finds of stone, also general progress of the stone industry. I am interested in sandstone, and we make sawed curbstone a specialty and find it has a very ready sale. We use the Dalrymple P. gangs for sawing."—*R. J. Hamilton, for Hamilton & Daily, Brookfield, Ohio.*

NEW ENGLAND NEWS AND NOTES.

THE Ryegate Granite Company, of South Ryegate, Vt., will work the immense stone taken from the mountain into a soldiers' monument, to be erected at Gettysburg, Pa.

Rhode Island produces not far from a million dollars' worth of granite annually. It stands first among the granite-producing states in the value of granite devoted to monuments and general cemetery and decorative work. Washington and Providence are the most productive counties; and smaller amounts come from Newport and Kent counties. The most of the granite is sold as cemetery and monumental stock; for general building purposes about half as much is used, and smaller amounts for street work, bridge, dam and railroad work. The granite quarries and works located at Westerly, Washington county, have long been celebrated for the very fine ornamental stock produced. Most elaborately ornamented monuments and statues are turned out in great number. The plants for finishing and polishing are exceedingly well equipped, all the latest improvements in quarry tools being freely used. The stone is particularly well adapted for successful ornamentation and fine finish, and this accounts largely for the prominence of this branch in the granite industry in the state. In fine carving a pneumatic tool, striking exceedingly rapid blows and operated by heavy air pressure, is becoming popular among the granite cutters. The rapidity with which fine work can be executed is very much increased by the use of this tool. Its value in connection with granite, as well as with ornamental marble, has already been satisfactorily demonstrated.

The Vermont Marble Company's quarry in Clarendon, Vt., is proving a very valuable one. Two varieties of marble which have never before been found in this country or in Europe, are found here in large quantities, and are of great value. John B. Reynolds has purchased the quarry north of that of the Vermont Marble Company, and will soon begin active operations.

Buckley & McCormick, for some time past located at 168 Broadway, Malden, Mass., have recently purchased the granite quarry of David L. Tilton, at Enfield, N. H. This quarry produces a fine quality of light building granite, and it is the intention of the present owners to shortly remove their sheds to Cambridge or Charlestown, in order to secure better terminal facilities.

Newhall & Cummings are a new firm of granite manufacturers at Barre, Vt.

Mica quarrying in the New England states is a growing industry. Maine and New Hampshire have a number of mica quarries which produce a good quality of mica for electrical work in which there is a very large demand for the product. At present prices, a good quarry of this material is a source of profit, and the industry should be more extensively developed.

The annual product of Vermont sea green slate quarried by the Vermont Slate company, at Fair Haven, during last year was in round numbers 189,000 squares, or 1,423,000 pounds. This is nearly 45,000 car-loads, or 1,890,000 square feet of roofing, which, laid twelve inches wide, would make 18,900,000 feet. This is an increase of over 20,000 squares, and many orders were refused, owing to the inability of the producers to fill them. Every quarry in the state has been worked to its utmost capacity as far as practicable. Orders are now coming faster than ever before at this season of the year, and it is certain the sales will be the largest in the history of the slate business if the slate can be supplied to the trade. The remarkable impetus has been given to the slate business by the Sea Green Slate Company, the sales of the green slate having exceeded that of any other in this country.

The Plymouth, Conn., granite quarry is being operated by Gay & Gaul, of Reynolds Bridge.

Professor George H. White, of New Haven, has been at the Portland, Conn., quarries making drawings and getting exact impressions of fossil remains imbedded in the brownstone. He secured considerable valuable information, which he will embody in a magazine article to appear in January. The article will be illustrated.

The ladies of Westerly have raised the necessary money for the purchase of a granite vase which will be sent from the town to the world's Columbian exposition, as an exhibit from the women of Westerly. The design accepted is a pedestal with a granite column, upon which is a vase, the height of the whole combined being five feet, two inches. The base is of two pieces of stone, and upon one will appear the following inscription; "From the Women of Westerly, R. I." Upon the base rests a column three feet in length, and circular in form, the upper half containing grooves, that is, hollows cut into the surface and at an equal distance apart. A cornice of Ionic architecture surmounts the columns and upon this rests a vase, which is two feet across, and designed for holding plants. The accepted design was submitted by the Chapman Granite Works and the contract calls for its completion April 1, 1893. It will be placed in the Woman's building at the fair and at the close will be returned to Westerly and placed in a niche in the entrance hall of the Memorial building, now in process of construction. The committee having charge of collecting the funds received generous donations from the residents of Pawcatuck, in the state of Connecticut.

There is no let-up to the business in the Shaler & Hall quarry at Middle-

town, Conn.,. Another large barge has loaded with 700 tons of the product of the quarry and sailed for New York. It is an unusual occurrence for a barge to be loading at the docks at Christmas time.

The stockholders of the Connecticut Freestone Quarry Company at Cromwell are congratulating themselves upon the success of their business enterprise during the first year of its existence. At a meeting of the directors of this company, held recently at their office in Cromwell, a dividend of twelve and one-half per cent, was declared on their capital stock, payable December 20. This dividend was declared from their earnings during the past year.

The contract for 3,000 feet of granite curbing for the city of Rockland, Me., to be used next year, has been awarded to C. C. Carver & Co., of Vinalhaven, Me., they being the lowest bidders in a competition with a number of firms. This is a union coöperative company.

The Quincy, Mass., Granite Manufacturers' Association has commenced work at the exhibit for the world's fair. They are being cut at the Mitchell Granite Works.

The granite business of John O'Rourke & Co., Plainfield, Vt., which for several months has been in the hands of a receiver, is settled. Hooker & Martin of the firm are going on with the business, and the stone-sheds are full of workmen for Hooker & Martin and another firm called the Coöperative Company.

Richard Messer has bought the building, stock and tools of the late Mr. Beaton's granite works at Claremont, N. H. He had previously bought the land. For the present he will do business at both the new and the old stands.

Messrs. Brown McAllister & Co., who have for twelve years operated extensively in the stone business in Bristol, Me., their quarries located at Round Pond, have decided to close their business there and move to other fields. This will be a great calamity to that part of the town, as this firm has given steady employment to many men.

Business at the Shaler quarries at Portland, Conn., is picking up. 1,700 tons of stone have been ordered, and they are shipping it as fast as possible. Two vessels have been loaded recently, and two more are ready to load. When these are shipped the stock of stone will be cleaned out.

The Connecticut Steam Brownstone Company, of Portland, of which E. Irving Bell is manager, have secured the contract for the stone for the new government building at Worcester, Mass. If granite is used the contract will be \$125,000.

The Maine Red Granite Company, at Red Beach, also the plaster mills at that place, continue to make large shipments of their respective products, both by steamer and sailing craft. The three-masted schooner, William

Cobb, plaster loaded, from the above place and bound for a southern port, was in the harbor, and the company's lighter, the Rocky Mountain, landed another lot of 360 barrels for trans-shipment by the inter-national steamers, it being part of an order being forwarded to Australia. In addition to the plaster, the lighter had a quantity of polished granite, intended for New York parties.

The debris of the Vanderbilt fire, at Newport, R. I., is being cleared away rapidly. It is reported that Mr. Vanderbilt has decided upon a stone structure.

The contract for the construction of a public building at Worcester, Mass. has been awarded to the Vermont Marble Company, of Proctor, Vt., at its bid of \$130,602.

Hughes & Smith, slate quarriers, Monson, Me., have gone into insolvency.

Teams are hauling rails, machinery and supplies for the new quarry on Wilkin's Hill in Monson, Me., and work is progressing rapidly. Mr. A. Sampson, formerly with the Monson Slate Company, is in charge. Rumor has it that the Lakeside Company has uncovered a new eleven-foot vein of slate at their quarry which is showing up well. This company under the efficient management of Nelson Phillips, is rushing work along in fine shape.

Work on the quarries on Mt. Heagan has stopped again and will not probably start until the courts decide whether Mr. Sargent or Mr. Beard shall run it in the future.

The Standard Granite Company has been organized at Tremont, Me., for the purpose of carrying on a granite or stone business in all its departments, as well as a general contracting and building business, with \$50,000 capital stock, of which \$30,000 is paid in. The officers are: President, C. J. Hall, of Belfast; treasurer, E. L. Warren, of Mt. Desert.

The Brainerd Quarry Company, Portland, Conn., made their first shipment of stone direct to Philadelphia by overland route recently. They have recently completed a railroad track in their own quarry whereby cars from the Air Line road are run into the yard and loaded by the traveler. Formerly the stone has been carted to and loaded at the Shaler & Hall quarry. Greater convenience and less expense is attended with the shipment than formerly. The Brainerd quarry is now one of the best arranged for the handling of stone, and a much greater amount of work can be performed with the same number of men that ever before.

There is, as yet, no sign of a cessation of work at the quarries in Lee, Mass., and it is probable that there will be no let-up during the winter. Although work on the state house has ceased, until after the legislature has met and adjourned, stone is still gotten out for that contract. Gray & Son are cutting the stone for the Harvard College job. The contract for the great depot extension at Philadelphia has also been awarded to

them, but this will not make any more work in Lee, as a western stone is to be used on that building and the work will be done at their stone cutting shops in Philadelphia.

The C. H. Huntoon Granite Company, Barre, Vt., are soon to complete the big mausoleum for San Francisco parties. They are also making a monument for the mother of William Cullen Bryant, to be set up at Princeton, Ill.

Augustus Longfellow, of Granite Hill, Me., leased his Pine Grove, Me., quarry to Will Carlson, Mr. Spencer, Dustin Ela and a few others, who have formed a coöperative company to get out paving blocks.

The stone business was at a stand-still in Milford, N. H., last winter with many of the firms. This year many of them, if not all, will do something through this winter. Kittredge & Stevens have a big paving stone order; Miller & Luce will not uncover their granite till spring; D. L. Daniels will keep at work; Young & Son will run, and at present Perham & Fields are prospecting on Dunklee Hill with good prospects, as good granite is there, though the quantity, as yet, is unknown.

John Duffus, Williamstown, Vt., moved his granite business, January 1, to the new sheds of the Elliott Brothers.

The Stony Creek, Conn., quarries have started up again.

A new industry has developed itself in Maine. The extensive lime-kilns there are using crude petroleum instead of wood. The oil is forced into the kilns by steam, and produces such an intense heat that it is necessary to make eight draws a day instead of three under the old plan, with the result that the lime is whiter, purer and of better quality and the saving in cost of fuel and labor is said to be fifty per cent.

Jones Brothers, Barre, Vt., contributed \$80 toward their employes' Christmas celebration.

The quarries at Branford, Conn., are resuming operations again. Norcross has 140 men at work at present and more are expected every day. This will be good news to the residents of Stony Creek, as business has been dead for over six months.

J. W. Buck & Co., Mooseup, Conn., who have the contract to dig out the foundation for the new Aldrich mill and put in the stone as far as the brick work, have purchased the ledge and right of way thereto in the rear of J. W. Hurlbut's residence, and will commence at once opening up the same for rough stone for the foundation. The cut-stone to be used will come from Sterling.

Mr. Joseph Shea, Annisquam, Mass., has opened a quarry on his land at the top of the hill. The stone is of good color, works well and makes good paving.

The granite firm of Martin & Wilson, Barre, Vt., has dissolved partnership. The business will be continued by Mr. Martin.

Messrs. Crabtree and Havey have a fine winter quarry at Bar Harbor, Me., and have lately added to their crew a number of men and are doing a large business at present, mostly in curbing stone.

Mr. Walter Wells has just opened his quarry on "Crank Farm," Lincoln, and the granite proves to be the nicest found in eastern Maine.

The Freestone Quarry Company, of Cromwell, Conn., under the management of O. W. Mack, have put their men on full time for the winter. The company have orders sufficient to keep them running until March. The shipments will be made by water until the river freezes.

The new Catholic church at South Norwalk, Conn., will be of stone and will cost in the neighborhood of \$80,000.

G. W. and C. W. Davis, of Peabody, Mass., recently advertised for twenty-five quarrymen. They are doing a large business, and one day shipped 125 tons of building stone. They have a large contract to furnish material for the foundation of the new Thompson-Houston buildings at Lynn.

Messrs. Marr & Gordon, Barre, Vt., are getting out forty-five blocks of granite, each weighing about thirty-five tons, to be used in constructing a new depot at Philadelphia.

The sheriff has served attachments for nearly \$10,000 against Winthrop Otis Sargent and Francis T. Sargent, who quarry granite at Oak Hill, Me., in favor of Booth Brothers and the Hurricane Isle Granite Company, for an alleged breach of contract to deliver granite paving blocks in Belfast, and the sheriff has attached accounts in the hands of a third party.

Mr. Ward, of Portland, treasurer of the Monson Hillside Slate Company, who are opening a new quarry on the Burmah vein, has made arrangements for operating at once. Their new buildings are completed and men are at work setting up the machinery.

J. T. Tank is doing an extensive business at his quarry in Northbridge, Mass. He has three Ingersoll steam drills at work and has just procured a large stone crusher from parties in Pennsylvania, which will be used in crushing stone for the leading markets. His recent improvements cost about \$3,000.

S. R. Hawthorne, the inventor and patentee of the Hawthorne slate and metal roofing process and also of snow and ice guard is to form a company called the Hawthorne Slate and Roofing Company with works at Hartford, Conn.

It is reported the Shaler & Hall Quarry Company, Portland, Conn., will pay a dividend of five dollars on each share of stock, making for the year a dividend of twenty dollars a share. It is said the Middlesex quarry will pay a dividend of two dollars a share, while the Brainard, owing to large expenditures for the improvement of the works during the past year, will pay no dividend. They are in good shape for next year, however.

CONVENTION NEWS.

THE INDIANA ASSOCIATION.

THE third annual convention of the Indiana Marble and Granite Dealers' Association was held at the Spencer House, Indianapolis, Friday, January 13, 1893.

The following dealers and firms were represented: Frank Alford, Lebanon; J. B. Schrichte, Rushviller; Aug. Diener, Indianapolis, Vermont Marble Company, Proctor, Vt.; W. H. Perry, Concord, N. H.; Boicourt Bros., Indianapolis; Ohaver Bros., Lafayette; Jones Bros., Boston, Mass.; Chas. Clements & Co., Chicago; John P. Le Page, Indianapolis; Schuyler Powell, Logansport; D. E. Hoffman, Winchester; S. C. Carson & Co., North Manchester; Goth, Coleman & Co., Indianapolis; W. R. Smith & Sons, Muncie; Ham & Pusey, Shelbyville; Theo. F. Gaebler, Rockville; Henderson & Co., Lafayette; R. A. Curtis & Co., Indianapolis; Gouverneur Marble Co., Gouverneur, N. Y.; Albertson Marble Co., Worcester, Mass.

The convention was called to order by President Ohaver at 2:30, p. m.

The minutes of the previous meeting were read and approved.

Applications for membership were received and accepted as follows: Henderson & Co., Lafayette; Theo. F. Gaebler, Rockville; Goth, Coleman & Co., Indianapolis; W. R. Smith & Sons, Muncie; Ham & Pusey, Shelbyville; Albertson Marble Co., Worcester, Mass.; Gouverneur Marble Co., Gouverneur, N. Y.; R. A. Curtis & Co., Indianapolis.

The report of the secretary was read and approved. The treasurer's report was read and referred to the auditing committee, consisting of C. G. Leavenworth and Theo. F. Gaebler, who attached their signatures in approval of the same.

In the absence of the chairman of the committee on the constitution of the National Association, no report was made. The secretary read a communication from James Harsha, president of the National Association, to President Ohaver, asking the coöperation of the Indiana Association in strengthening the National, which provoked considerable discussion. Mr. Leavenworth thought favorably of joining forces with the National association, as the needs of state organizations would be brought nearer those directly interested and in a position to help them, were a national association thoroughly supported. Mr. Jones recited at some length the benefits accru-

ing to state associations by joining the National, as did also, Mr. Powell, who had acted as a delegate to the National, and had become thoroughly conversant with the intents and purposes of the organization.

Mr. Boicourt thought that the expense for representation was too great to warrant too hasty action upon the part of an association unable to boast of a healthy financial condition. Mr. Hoffman favored it because many of the evils now encompassing the state associations could be removed through influence of the national body. Mr. Le Page thought it expensive and too much of the nature of an experiment. Would suggest that the wholesalers combine to prove their interest in the affairs of the dealer and if successful in removing some of the features regarded by both wholesaler and retailer as objectionable to the trade, then enlist the co-operation of the retailers for the removal of other evils. He related his experience with wholesale establishments in evidence of the fact that sometimes well-intentioned dealers were unfairly dealt with by wholesalers.

Mr. Jones stated why the experience of Mr. Le Page rendered it the more necessary that well-meaning dealers coöperate with wholesalers for the preservation of the rights of each.

Mr. Rockwood showed where mutual benefit would occur in perfecting an organization strong enough to dictate measures of relief to those in a position to adopt them and thought that with the wholesalers and retailers possessing equal power and wielding the same amount of influence, no dealer would be unduly blacklisted.

Mr. Jones declared that, whereas, at present a dealer had no way of settling differences with the wholesalers except by recourse to the courts, the wholesaler could by means of his eastern association worry the dealer. This came from organization. Were the dealers properly organized they would have the same means of redress as the wholesaler.

Mr. Gaebler told how some wholesalers circumvented others in the same association when they desired to sell a man esteemed by themselves as unquestionably good but who had been blacklisted through the influence of some concern with unjust business methods. Would favor an organization of retailers so strong that if the dealer with an honorable business record and a disposition to do what was right should be unfairly treated by a wholesaler, he could obtain redress from his association.

Mr. Le Page realized the benefits likely to accrue by reason of such an organization and withdrew his objections. Moved that a committee of three be appointed to carefully examine the constitution and by-laws of the National association and be clothed with arbitrary powers so that if in their judgment it was deemed expedient for the Indiana association to join the National association, they might make formal application for membership therein. Carried.

Messrs. Powell, Boicourt and Rockwood were appointed to serve as such committee.

On motion a committee consisting of Messrs. Leavenworth, Ranck and Curtis was appointed to nominate officers. The committee reported as follows: President, Z. T. Boicourt; secretary-treasurer, H. A. Rockwood; vice-presidents, T. F. Gaebler, J. B. Schrichte, J. P. Noftzger, John Ohaver; board of directors, Schuyler Powell, Frank Alford, J. B. Shaughter, Aug. Diener, J. J. Little, D. E. Hoffman, Alf. Boothroyd, N. P. Doty, D. W. Paul, C. L. Batchelder, Al. Snoots, Hugh Jones. Report accepted and ballot cast by secretary.

Mr. Rockwood explained the inconsistency of one in his position occupying such an office and resigned in favor of Mr. Ranck who was unanimously re-elected, in spite of his declination.

President Ohaver delivered his valedictory and welcomed his successor, Mr. Boicourt, who responded in a neat speech.

Moved and seconded that a vote of thanks be tendered President Ohaver and Secretary Ranck. Carried.

A communication was read from C. W. Hills, of Jackson, relative to a world's congress of marble and granite dealers at the Columbian exposition and urging the association to take action in regard to same. Resolution indorsing the plan had been adopted at the meeting of the Marble and Granite Dealers' Association of Michigan at the Kalamazoo meeting.

After a short discussion participated in by Messrs. Batchelder, Jones and Diener, the secretary was appointed a committee of one to correspond with chairmen of like committees of other associations regarding the advisability of concerted action, and to be governed by general sentiment as to the adoption of the plan on the part of the association.

Treasurer reported bills of expense as follows: John Ohaver, as delegate to the National convention at Quincy, \$82; Schuyler Powell as delegate to convention of National association at Cleveland, \$18.75. Motion by Mr. Leavenworth that they be allowed and an order drawn on treasurer for the amount carried.

Adjourned subject to call of president and secretary.

THE MICHIGAN ASSOCIATION.

THE Michigan Marble and Granite Dealers' Association convened in the parlors of the American House, Kalamazoo, at 3 o'clock p. m. President Philo Truesdell in the chair.

On roll-call twenty-two members were found present.

Mr. Geo. C. Winslow made an address welcoming the marble and granite dealers to the city.

Report of the secretary and treasurer was read, showing the association was out of debt and had money in the treasury.

The secretary reported as good a feeling among the members as could be expected and that the association now numbered fifty-three members.

Philo Truesdell, of Port Huron, was appointed delegate to the National convention at Cleveland, January 11.

The following officers were elected for the ensuing year: President, Chas. Schmidt, of Grand Rapids; vice-presidents, northern district, M. C. Barney, of Flint; southeastern district, W. H. Hoyt, of Plymouth; southwestern district, T. J. Edwards, of Dowagiac; secretary and treasurer, C. S. Harris, of Lansing; board of directors, Philo Truesdell, Port Huron, Alex. Mat-telson, of Grand Rapids, F. F. Murdock, of St. Johns, C. W. Hills, of Jackson, Dennis Kane, of Sturgis, Davidson & Sons, of Chicago, Ill., C. H. More & Co., of Barre, Vt., Jones Brothers, of Boston, Mass.

The committee on congress of dealers at the world's fair made a report that this association should appoint a committee to confer with committees of other associations, and that this association should give expression at once as to what was wanted.

The association adjourned to meet at Port Huron in July or August. Date to be set hereafter.

DETROIT CONTRACTORS AND QUARRYMEN.

THE annual meeting of the Cut-Stone Contractors' and Quarrymen's Association of Detroit, Mich., will be held on Tuesday, February 8, 1893, at No. 14, Kanter block, Detroit. A committee of arrangements have the matter in hand, and a pleasant and profitable meeting is assured.

THE QUARRYMEN'S NATIONAL ASSOCIATION.

THE second annual convention of the National Association of Quarry Owners will be held at the Grand Pacific hotel, Chicago, February 21, 1893, at 11 o'clock a. m. A full attendance of all members is earnestly desired, as business of special importance will come before the meeting.





EDITORIAL COMMENT.

THE chateaus of France, which present the best examples of stone architecture, and those which are readily adaptable because of the picturesqueness of outline and the character of detail, will form the subject of a series of articles beginning in the February number of *STONE*. To the architect, stone contractor, the worker in artistic stone decoration, those interested in handicraft, we can say that no matter of such high interest has ever been presented in a journal of this character. There is none of the world's architecture which presents so many features of historical, military, constructive, decorative and social interest as do these Chateaus of France. It is only surprising that this material has not before found expression in the English language. We trust that this matter will be fully appreciated in the field in which it can do such great good.

ANNEXATION of Canada is now the hobby of the *New York Sun*. It has begun the agitation of the subject and is tenaciously adhering to it despite the caustic criticisms, ridicule and denunciations hurled at it by other members of the American press. It is a peculiarity of that paper that it keeps at work, regardless of what others may think or say, and more often than otherwise its continued efforts win first admiration and then support. The ground gone over in this matter of annexation does not change materially from year to year. Practically the same conditions govern

the commercial aspect of the situation that have governed it for years. So far the disposition to annex has been largely on the Canadian side of the line, and there is no evidence that any great change has taken place in 1892. Indeed, it is improbable that any change will take place for years. It must be a slow growth, an educational preparation of two distinct nations before the subject of annexation can be broached with any possibility of favorable consideration by the great mass of American population.

CANADIAN sentiment is leaning toward annexation more strongly each year. There can be no question about that. Indeed, a visitor to Canada will be impressed with the importance of such a move to Canadian interests before being in that country a day. Something is wrong. Something is lacking in the country where such wonderful natural resources as Canada possesses are comparatively undeveloped after such a long occupancy. And yet the development has been measurably rapid, and has met the expectations of the more conservative Canadians. The fault does not lie in the commercial interests of the country for they are apparently as active as can be expected under existing circumstances. It must be, as some of its business men have said many times, in the form of government, and for that reason they wish to become a part of this great, prosperous republic.

WHETHER the interests of the United States would be advanced by annexation is a debatable question. Racial differences would be of much influence in determining the probable outcome of the union. These characteristics are marked in many ways, and the sudden advent of a body of delegates at Washington, representing so extensive a constituency as Canada, would be one of the most puzzling questions this country ever encountered. Religious, educational and many other systems and characteristics are greatly dissimilar, and, if this nation must restrict, or, mayhap, prohibit the immigration of a few thousands of the alien population of Europe from coming here to mingle with the present population, how can it hope to nationalize, Americanize, if you will, a whole nation at once?

THIS is no screed against Canadians; nor against their government. It is a discussion of one point in the question which has been untouched before. It may be argued that conditions are not similar; that the immigrants from Europe are not the cream of the population, the active business men, the intelligent progressive portion of the community, but the scum, the undesirables, the anarchists and riff-raff, and that it is unfair to class the progressive, intelligent Canadians with them. That is true; but the principle is the same. It is the sudden addition to our population of a great nation out of sympathy with American institutions, and out of sympathy with them because it does not comprehend the underlying principles upon which the American republic is based. That is all; and no one pretends to say that it is against the people. It is simply one of the problems which must be encountered in the event of annexation.

CONTINENTAL union means a distinct commercial gain to this country une-

qualed in the annals of the world. It would give clear possession and undisputed control of one of the grandest inland navigation systems on the globe, a system greatly strengthened and improved by the Canadians in their endeavors to build up business interests in their country. It would bring to this country great areas of productive agricultural lands, thousands of acres of which have never yet been utilized. It would give to America a forest area, the like of which doesn't exist on the North American continent. Vast mineral resources, enormous fishing interests, and untold possibilities in the fur trade are hidden, as yet, in Canada, and more than that, it would forever settle the question of the possible necessity of protecting almost 3,000 miles of frontier in case of a war with England. Perhaps the advantages more than balance the disadvantages, and continental union is desirable. If it is, it would be better that formal action be taken first by Canada, the country really most interested. Until then the United States can afford to take no steps with that end in view.

IMMIGRANTS are wanted to the south of the United States and unlimited opportunities for building up great populations in the development of the resources of the Central and South American republics still exist. Sparse population hinders a general utilization of only a small proportion of what lies ready at hand in those wonderfully endowed regions. It is to those countries, where the willing hands of the immigrants from Europe are needed that the ever-swelling streams should be turned. There they will be appreciated, while here they are worse than useless.

THE question of the regulation, restriction or complete prohibition of immigration has been pressed upon this congress until some sort of action seems

probable. Senator Chandler's bill prohibiting for one year immigration from European countries is the best thing yet proposed, and seems to meet all the requirements of the case as fairly as is probable under any system of regulation likely to be brought forward for some time to come. It is only too evident that the time for regulation, if not prohibition has come. The question of the introduction of cholera infected accessions to the population of the great cities is becoming too serious to be longer relegated to the future. It must be met, for upon its solution depends not only, in a large measure, the success of the Chicago exposition, but the health and lives of thousands of the present population of the cities. Something must be done, and, as the people must depend upon congress for relief, it must be said that the people are more than pleased at the stand taken by Senator Chandler and those who stand with him in this matter.

THE architect's specifications for the new congressional library building at Washington calls for an expenditure of \$600,700 for foreign marble, and only \$38,600 for the domestic product. Of the foreign marbles \$275,000 are for colored varieties and \$326,700 for Italian. A specification of this character may have gone unchallenged thirty years ago, but it deserves no place in such a document to-day. It is a declaration that there is no domestic product fit for the best use to which such material is put—which is not true. There is as good marble for the interior finish of public buildings derived from the quarries of Vermont, New York, Tennessee, Georgia and other states, as can be found in Italy, Germany or any other country in Europe. It may be surprising to some people, therefore,

why so much of foreign marble has been specified in this instance. The architect, from a professional standpoint, may not justly be censured, since he was not restricted in his choice of this material, and is perhaps as patriotic a citizen as anybody. His environment, we think, as much as any other influence, governed his choice, and his professional pride inspired him to emulation of the grand work of his predecessors. For the result he may be pardoned on this score. But that much may not be vouchsafed the congressional authorities which failed to denominate the quality of the material which should be given preference in this public building. Considerable of the marble in the finest public buildings of Washington is foreign, and there are no public buildings on the face of the globe superior in an artistic and architectural sense, taking them as a collection, but the best of them were built long ago, before the marvelous resources of our own country in this material were known or understood. The fact that foreign marble was selected then, is no reason why it should be preferred now, unless to carry out a uniformity of finish of all such buildings, and if that, the selection is more to be deplored, for this is an era of new ideas and new creations, be it in business, in art, or in architecture the exemplification of art in its highest forms. But as said before, American marble, in all varieties, is equal in texture, in finish, and superior in enduring quality, to any marble imported, excepting possibly the white Italian. For an example of this compare the marble in the state capitol of Indiana with the marble in the national capitol. There is not a corridor in the world so grand and beautiful as that in Indiana's capitol building, and it is made so with the product from American quarries.

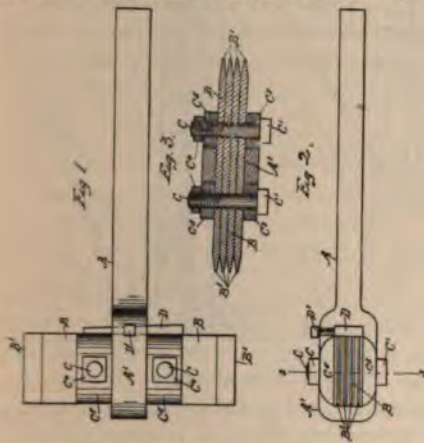
WHILE STONE has the highest respect for the government architect or any other architect who solely from a professional sense specifies a foreign product, we believe at the same time there is reason, grounded in patriotic duty, which should prevail above individual prejudice, whenever possible. By this is meant that architects, as a rule, are not as well acquainted with domestic marbles and granites as they should be; they have not made investigation of discoveries in these materials as much of a study as they have the older stones. This is a pretty broad assertion, but we believe it is true, if we should take the statistics of the amount of product annually used in the building works of the country for a criterion. It ought not to be so. There should be a stampede from old prejudices, and a reaching out after the new things which the enterprise and progress of our people has developed. The architect who is up with the times makes a study of the latest discoveries, and incorporates them in his work when found available. The architect who specifies material solely from his knowledge of it as it appears in old standing work, is not up with the times. The stone industry of this country should protest with all its strength against discrimination in favor of the foreign product, until it is shown conclusively that the domestic product is inferior for the purpose required in government work. The Tennessee colored marbles are in every respect adapted to the use designed in this congressional library building, and the same may be said of the light marbles of Vermont, with the exception as above stated in favor of Italian white—and that might be dispensed with, without serious detriment to any interior containing stone of many shades—as *vide* the Indiana capitol building.

THE interest being taken by all classes of people in all sections of the country in the matter of improved streets and highways is encouraging, not alone to those whose comfort and convenience in the use of good roads is of first importance, but from a business standpoint by quarrymen. Road improvement means the use of the best road material, and that is stone or granite of suitable quality. It means the utilization of quarry refuse and consequently the disappearance of the dump pile, which is the nuisance of most quarries. It means also a more general employment of convict labor, and the withdrawal of this element of competition from the skilled trades. So long as criminals must be provided for and their labor in a measure be engaged as a compensation for the state, it would seem to be the best application of it to employ it in direct benefit of the people—in building our highways and preparing the material therefor.

THE people may not look to our political law-making bodies alone and entirely for this reform. It must come about from an aroused public sentiment in favor of it. Such a movement is taking shape in many sections, and it is gratifying to observe that it is enthusiastic and well-organized. Here in Indiana an effective organization has been put under way and its influence is becoming manifest, as evident in the proceedings of farmers' institutes, racing associations, county boards and municipal governments. It should spread until every state in the union has its road congress. We present on another page of this issue a circular letter from the secretary of the Indiana association inviting the coöperation of all citizens interested. Our readers, the quarryman and stone contractor and dealer, should take a leading part in this work.

RECENT PATENTS.

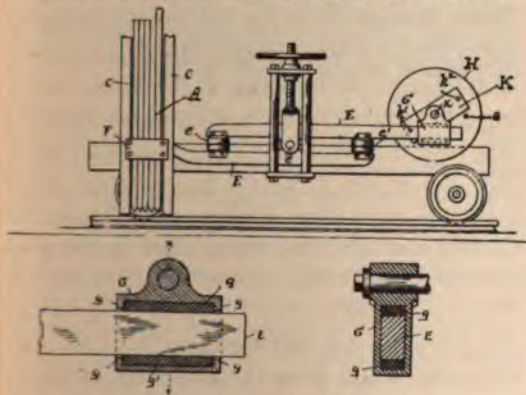
STONE DRESSING HAMMER.—Patent No. 477,017, dated June 14, 1892, issued to George



(No. 477,017.)

McDonald, Troy, N. Y., relates to an improvement in a stone dressing hammer.

STONE CHANELING MACHINE.—This is a machine for stone chaneling, having a lever pivoted between its ends and the drills attached to



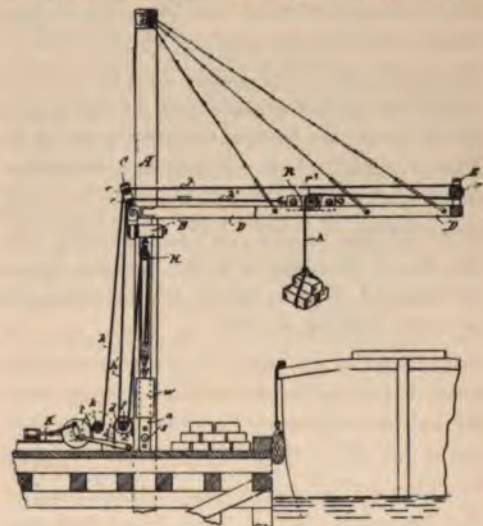
(No. 486,847.)

one end. There is a box supporting the opposite end of the lever, made in a single piece and connected with the power shaft. The box has

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a longitudinal opening through its center for the lever, and recesses above and below the lever, closed at their ends and provided with separate bearing-pieces confined in the recesses and between which the lever is supported and can slide. The patent is No. 486,847, issued November 29, 1892, to William H. Bryant, North Amherst, Ohio.

HOISTING APPARATUS.—This apparatus consists of a mast erected upon a dock, the side of a quarry, or other place where required for the purpose of lifting heavy weights. On the mast are supported arms capable of being swung in different positions, and trolleys working upon the arms. There are hoisting machines in con-

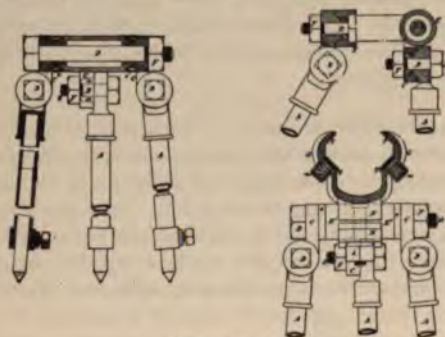


(No. 488,044.)

nection for working the hoisting ropes. The tackle-ropes each pass from one end of a trolley over a pulley or pulleys, to and around a drum with a brake, and from there over the pulleys of two blocks of the hoisting-tackle, to one of which blocks the other end of a tackle-rope is secured. Weights are guided in the mast sus-

ended from one of the blocks while the other is secured to the mast. The patent is No. 488,044, issued to John E. Walsh, New York City, December 6, 1892.

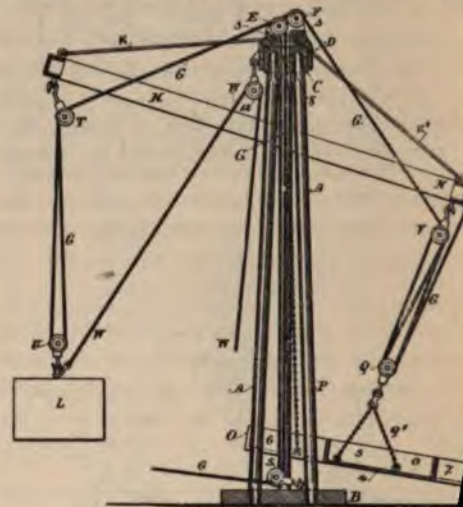
TRIPODS FOR ROCK-DRILLS.—This is an improved tripod or stand for a rock-drill, consisting of a head (*e*) arranged to receive the drill and provided with as many conical seats as the stand has legs. The parts (*c*) each have a conical projection (*c*) to enter one of the seats, and bolts (*d*) and nuts (*f*) are provided for binding the parts (*c*) securely in the seats of the head. Each part (*c*) also has a conical seat in a plane



(No. 487,256.)

at right-angles to its conical projection (*c*). A conical projection (*a*) is formed on each leg (*a*) which enters the conical recesses in one of the parts (*c*) and bolts (*b*) and nuts (*f*) for tightening each leg (*a*) in the part (*c*). There is a cradle and a liner, mounted in a recess provided with suitable guides and springs acting upon the liner. The patent is No. 487,256, issued December 6, 1892, to Albert W. and Zacharias W. Daw, Laurvig, Norway.

DERRICK.—This apparatus has a stationary mast or frame with a turn-table upon its upper end, and two sheaves supported by the turn-table. The boom consists of two pieces passing the mast freely at opposite sides, united at the



(No. 487,453.)

ends, and devices by which it is suspended to the turn-table. There is a counterpoise block at the respective ends of the boom, the hoisting cable passing through the turn-table over one of the sheaves to the block which is fastened the weight to be raised, returning over the other sheave to the other end of the counterpoise, whereby the power is exerted to raise the counterpoise until it has sufficient leverage for lifting the attached weight. The patent is 487,453, issued December 6, 1892, to James E. Serrell, New York City.

BOOKS AND PERIODICALS.

"What Shall I Learn? or the Young Men's Business Guide," is a book of 221 pages published by H. L. Everett, Philadelphia. Fifty-five of the leading occupations are fully set forth and described and the best way to begin each one and succeed in its prosecution. In the space here available it would be impossible to outline what is said of each occupation described. Perhaps such a task would be unnecessary, even if carefully performed. A better way is to purchase the book and see for yourselves. While one may not agree with all that is said, and while the prices there given as paid beginners and those farther advanced in some particular trades may be somewhat more liberal than some are accustomed to receive, the book is, in the main, filled with good, wholesome advice to parents and young men, and is worthy a place in any well selected library. It gives the basis of what is required in learning almost any business, and beyond that the young man will be able to decide for himself.

"Who Pays Your Taxes?" is a compilation of the views of leaders in this discussion edited by Bolton Hall, and published by G. P. Putnam's Sons, New York. It is another addition to the long list of publications devoted to the discussion and elucidation of economic and sociologic theories and calculations. This book presents a number of varying systems of taxation for consideration, and will certainly assist materially in forming correct ideas upon this important matter. One good feature about it is the omission of long and wearisome statistical tables in the body of the book. It is a question growing more important daily, and whether one pays protective taxes, as charged by some, or only local taxes for the support of government and the maintenance of the physical protection principle, the question is one which should be studied from all standpoints. Mr. Hall may have compiled a book containing opinions which are distasteful to some of us, but we can give the opposition the credit for as much honesty of purpose as we possess ourselves.

and feel glad that a subject which so intimately concerns every adult citizen is so ably and fearlessly discussed.

Jacob Schoenhof was once a United States consul, and was commissioned by the government, under Mr. Cleveland, to make certain inquiries in Europe regarding "The Cause of High Wages." His researches have been embodied in a book recently issued. Many causes have been assigned for high wages, but the cardinal principle enunciated in this volume is that it is the cunning of the hand and brain that regulates wages, the constructive ability as developed in the technical schools and manufactories of the Old World. The only fault anyone can find with the book will be, possibly, that it doesn't ascribe sufficient influence to protection in maintaining high wages. But if one really cares for all sides of discussion it is a good book to read, and, perhaps, study. There cannot be too much information on these points, and it matters comparatively little where it comes from if it is reliable, and there is ample internal evidence that this book has been compiled with care, and an honest attempt made to get at true statistics and to make accurate statements. Hon. Thomas F. Bayard writes the introductory letter, and incidentally tilts at some political abuses, which need it. G. P. Putnam's Sons, New York, publishers.

In these days of architectural discussion one is often seriously troubled by reading that a new church would be decorated with "canabic composition," and that it would have an especially striking "campanile," and that the pulpit would have a "camerelle" opening just at the right. All these terms are more or less puzzling to the average reader. Sometime ago George O. Garnsey, editor of the *National Builder*, prepared the "American Glossary of Architectural Terms," a copy of the third edition of which has just been received. It is gotten up in elegant style, blue cloth binding, good paper and typography. Alternate pages are occupied with good illustrations indicating very graphically the meaning of the many ar-

chitectural terms in common use. It is a complete dictionary of over 3,000 terms and 500 beautifully engraved illustrations, comprising a valuable collection of designs never before brought together, and of incalculable value to designers, architects, students and builders. The work embraces historical sketches of all styles and periods of architecture, together with mechanical and descriptive rules and data, useful in all branches of the arts and sciences. One large (8x12) volume, printed on special paper, handsomely finished; sent postpaid to any address for \$2.00. Published by The National Builder Publishing Company, Adams Express Building, Chicago, Ill.

The *Review of Reviews* for January contains a galaxy of brilliant attractions. It may well claim to be the most amazingly up-to-date number, of the most thoroughly alive magazine, ever published in the world. Its great and brilliantly-illustrated character sketch of President Diaz and the Mexican people and country was written in the City of Mexico since that gentleman's inauguration for the new term, and the photographs for illustrations were taken, exclusively for the *Review of Reviews*, in the City of Mexico in December. In view of the certainty of cholera next summer, the most sensational and interesting article of the month is the one the *Review* has secured from Paris on the successful treatment invented at the Pasteur Institute for inoculation against Asiatic cholera. This number contains a fine little sketch of F. Marion Crawford, the novelist, a profusely illustrated article on the latest results of the University Extension movement in the United States, and scores upon scores of attractive pictures of the most interesting people of the day—politicians, theologians, literary men, distinguished women, and so on. If anybody is at loss to know why the *Review of Reviews* has attained so extraordinary a circulation in so short a time, let him buy and read the January number and he will understand.

The frontispiece of the Christmas *Home Maker* is a magnificent colored head of the late poet-laureate of England. An article on Tennyson is illustrated with views of his birth-place, his various beautiful country homes throughout England, and many of his favorite haunts. Douglas Sladen furnishes an account of "A Visit to the Tiffanys of Japan," with pictures of the many rare things to be found there. Jenny June's "Notes of a Short Trip Abroad,"

bring us to the Falls of the Rhine and the Lake of the Four Cantons, with many dainty views of the picturesque country. Marion C. Smith contributes an excellent Christmas story, and Alice King Livingston shows us in the beautiful illustrations of her Colorado story, "The Cave of the Winds," that America is richer in beautiful scenery and natural wonders than the Old World. There is an interesting account of a visit to the "Home of Samuel Edison," the father of the great inventor, and a sketch of the mother of the great Adams family—Abigail Smith Adams. The two continued stories, "The Fall of Jason," by Willis George Emerson, and "Up-Hill," by Emma D. Connelly, continue to interest. Nor are the departments neglected. The Housewife gives all sorts of recipes. Decorative Home-Art tells us how to delight our friends with dainty gifts; and all the others follow in their usual order, completing a fine magazine.

The piquant title of Mark Twain's new sketch in the January *Century*, "The £1,000,000 Bank-Note," is borne out by the not less piquant motive of the story, which is a wager between two Londoners that a man with nothing but a £1,000,000 bank-note could not live thirty days and keep out of jail. The story records the unique adventures of the man who tried the experiment. Other stories are the third of Miss Grace King's Louisiana "Balcony Stories," entitled "La Grande Demoiselle," in which the author sets forth an interesting type of New Orleans society, and a story of official life in Washington, entitled, "The Reward of the Unrighteous," by George Grantham Bain, attractively illustrated by Wenzell. Add to these the second part of Mr. Balestier's western novel, "Benefits Forgot," the third part of Mrs. Burton Harrison's New York society story, "Sweet Bells Out of Tune," and it will be seen that the fiction in this number has much variety of scene and style. In subjects of public interest are Washington Gladden's sketch of the "Cosmopolis City Club," the first part showing why how the club was organized; further passages from the correspondence of General and Senator Sherman, dealing in an untechnical way with the gloomy years of the war; and a group of contributions relating to "The Kindergarten Movement,"—namely, an essay with that title by Talcott Williams, of the Philadelphia "Press," letters by well-known educators,—Commissioner W. T. Harris and Miss Angeline Brooks,—a contribution from a teach-

er in a New York free kindergarten, an editorial, "The Kindergarten not a Fad," and a poem by Richard Watson Gilder, "The Child-Garden." The recent spread of the kindergarten as an auxiliary to the public schools gives additional interest to this group of papers. All the other departments are quite up to the standard set by this magazine, and comprise the usual varied table of contents.

Indianapolis has a new claimant for public support, a quarterly, *Modern Art*, published by J. M. Bowles. The magazine starts with abundant assurance of success and the standard set is so high that it ranks among the finest art publications in the land in this, its first number. The frontispiece is a reproduction of a charcoal drawing, Dutch Landscape, by Harry Williamson, that one cannot believe is a reproduction until it is examined very closely. Mr. Williamson also contributes an appreciative article on "Modern Dutch Artists." "P. H. Ribot: A Study," is a sympathetic article by J. Le Fustec, the initial by Mary Robinson. James Whitcomb Riley's poem, "The Hoosier Folk-Child," with decorations by W. Forsyth, is by far the finest thing in the number. There are other important articles on art matters. Charles D. Helm, STONE's artist, is represented by two fine initials, and Louis H. Gibson, one of STONE's valued contributors, has an article on "Jules Cheret," a famous advertisement designer of Paris. Altogether the magazine is a credit to American art, and indicates to what extent art is being cultivated in Indianapolis.

"The Wonder Book." Who among us has not found clear explanation and renewed appreciation of some of the old Greek myths as worked out again by the magic of the wizard romancer, Nathaniel Hawthorne? It has been said that Hawthorne excels all others in his delineations for young people, and his Wonder Book goes far toward sustaining that statement. It is the same Wonder Book that delighted boyhood days, which now greets the grown man. It has been wonderfully enriched, however, by sixty or more designs by Walter Crane, interpretative of the text, and another perusal of it only adds to the impression it created years ago. Houghton, Mifflin & Co. have brought it out in very attractive form,

large type, printed on heavy paper. Its price is \$3.00.

Robert Grimshaw, M. E. has written, and the Practical Publishing Co., 21 Park Row, N. Y. have published "Tips to Inventors," a monograph of seventy-three pages, containing brief suggestions of inventions required, or which would pay the inventor well. It is a new idea, surely, to give "tips," of this sort, and some might question the ability of one man to give tips on so many different topics, but Mr. Grimshaw, has done it successfully, as a perusal of the book will show. Ten or more pages of statistics are added, comprising much valuable information in a very compact form. The book may be had for \$1.00, by addressing the above firm or this office.

What boy has not enjoyed the beautifully written stories of J. T. Trowbridge? The one who hasn't has missed a treat. His characters don't seem to be characters at all, but just actual people, who live and act out their lives before one's eyes. That is all. There is no straining after effect in the delineation of a character, no long introductions and stilted phrases, but a simple, natural telling of the life of each person written about. In "The Fortunes of Toby Trafford" he has given the world another of his pleasant stories. It is an absorbing boys' story, well worth careful perusal by any boy who wishes to gain correct ideas of a noble character, finally wrought out through ordinary human weaknesses and characteristic human mistakes. Lee & Shepard, Boston, \$1.25.

"Fighting for the Right," is another of the famous "Blue and Gray" series by Oliver Optic. This is eminently a story for boys, a story which incites to noble deeds, and additional strength of character. It is the same old style of Optic, that style which charmed us all when we were boys, and made us eager to see the latest from Mr. Adams' pen. There are noble aspirations and an awakening of the higher nature, an aroused desire to do better things and become more what one is capable of becoming. Boys will hail this volume with acclaim, not only for the reasons above stated, but because it abounds in adventure, thrilling escapes, and lively attempts to accomplish a definite work. Lee & Shepard, Boston, \$1.50.

NOTES FROM THE QUARRIES.

There is an increasing interest in colored stones, and the opportunity to use them in working out artistic designs is only beginning to be appreciated.

The quarry operated by John Bartel & Co., Clearfield, Pa., is furnishing work to a large number of men.

The Cumbler stone quarries at the Half-Way house, on the line of the Middletown and High-spire railroad near Harrisburg, Pa., will be operated during the winter, as it is the custom to run them all the year round. The output of the quarries the past year was the largest in their history, and the prospect is that that of this year will be in excess of it in quantity. The stone is of the best quality for the purposes to which it is applied, both for building and macadamizing, large quantities of the material being shipped to distant points by canal as well as by railroad.

The Split Rock Granite quarry between Essex and Westport, N. Y., has been sold by the sheriff for William L. Moran, to satisfy a claim for \$3,200. William R. Stockbridge was the purchaser.

The court of claims of New York has given judgment for \$66,835 in favor of Stout, Hall & Bangs in their suit to recover a balance alleged to be due from the government on account of granite used in the construction of the Congressional library at Washington City.

E. L. Kraus, manufacturer of noiseless school slates at Slatington, Pa., who occupied part of Henry Fulmer's slate factory at the time it was destroyed by fire, has leased the factory formerly owned and operated by the Blue Vein School Slate Company, located a short distance from Slatington, on the Slatendale branch of the Lehigh Valley railroad. The building is now being fitted up with proper machinery and work will begin in a few weeks.

The stone quarries south of Atchison, Kansas, have produced some beautiful calcite formations in the shape of stalactites and crystals. One fine stalactite over a foot in length was

found, on the edge of which was a cluster of beautiful crystals. At a depth of about thirty feet between two layers of carboniferous limestone, a great many crinoids and other fossils are found.

Dr. Heller has begun work in his limestone quarry at Bethlehem, Pa., which has been idle some time.

The Crown slate quarry property, consisting of about twenty acres of land, near Pen Argyl, Pa., was sold at sheriff's sale by A. O. Allen, of Portland, for \$2,000.

J. S. Focht's slate quarries of Lenhartsville, Pa., have a contract for 1,000 tons to be delivered by spring.

A highly imaginary report of a wonderful petrification having been discovered at Horst's stone quarry in vicinity of Smithville, O., is going the rounds. In the rock formation something is said to have been found that more resembles an elephant's head than anything else. Any menagerie that has lost an animal should investigate and claim property.

Lee Burt, of Detroit, is the principal stockholder in the Detroit Union Stone Company, incorporated with a capital of \$200,000. The company will have its office in Detroit, but carry on quarrying operations in Lorain county, Ohio.

William Diggins, of Seattle, has opened a quarry and established a plant at Charleston, Wash., for the purpose of crushing rock for macadamizing streets, making cement and like purposes. He has a large engine and a powerful Blake crusher already and will increase his works to meet the demand as occasion requires. He has constructed ways for scows and huge chutes to hold the crushed rock.

The Williams Lime Company of Chicago is a new corporation with a capital stock of \$100,000. The incorporators are Frank M. Melic, Azel W. Hatch and W. E. Miller.

Alex W. Nubelius, of Hacktstown, N. J., has been granted a patent on a method of separating graphite from crushed rock.

The Hollensbee Stone Company, of Greensburg, Ind., has entered suit in the circuit court demanding judgment against Thomas W. and William Kinsel on bond for \$4,100.

A \$60,000 transfer of quarry property, consisting of sixty acres in Henrietta, O., has been made by Marshall Sherburn to Lee Burt, trustee, Detroit, Mich.

Hugh Murphy, of Denver, Colo., is the manager and owner of the largest stone quarry in the Rocky Mountain region, and has 160 acres of stone ground and employs 150 to 200 men. The stone is a red sandstone and is used largely in paving. During the year just closed Mr. Murphy has sent out 5,000 carloads of stone of which Omaha took 2,500 and Denver, Kansas City, Lincoln, Kearney and points in Iowa the remainder. He estimates that there are now 30,000 carloads exposed at the quarry and ready to be taken out. The cliff has been laid bare for a distance of 1,500 feet. It has required five years of work to place the quarry in its present condition.

The Commercial Exchange of Denver, Colo., has received and is exhibiting from the Castle Rock Stone Company, six-inch cubes of Douglas county pink and white lava stone; from Mr. Weaver samples of marble from near Calmut, Chaffee county, and from different parties samples of kaolin from Fremont and Chaffee counties.

The lithograph stone quarries in Ralls county, Mo., await development.

The Keystone Plaster Company, Chester, Pa., has broken ground for some improvements in the shape of a cooper shop, which will soon be erected, as the present shop is not large enough to meet the demands upon it. The new one will be twice the size of the present structure.

When a tremendous blast exploded at the stone quarry at Washington, N. J., a few days ago, all the old-timers for miles around fell down on their marrow-bones and asked the Lord for forgiveness. Some of them had been very wicked of late and supposing that things terrestrial were about to come to a wind-up, they sought for mercy before the earth opened and swallowed them up. But when they learned that it was only a big blast, and that no one had been hurt, they hunted up their jugs and greasy cards again and are now doing business at the old stand. The explosion was a very loud one and the noise and rumbling

were heard for miles around. Window panes rattled in Belvidere and one's thoughts immediately went to the cometary disturbance upon which so much has been written of late.

The Glen Ridge Quarry Company has suspended operations at its quarry on Bloomfield avenue, Newark, N. J., on account of the excessive cost of getting out the stone, the quarry having been worked to a great depth.

S. D. Coykendall, of Kingston, N. Y., will have two new stone barges built during the winter. They will be ninety-five feet long, which is considerably larger than the average stone barge. One will be made at McMullen's ship yard and the other at McCausland's.

The *Denver Sun* says: No better marble exists in this country than that found in the marble ledges of Gunnison county, Colo. There seems no doubt that the projected railroad from Crested Butte to the marble fields would be an immense success. This industry will certainly become a valuable one before many years.

Preparations are being made for a great display at Chicago of onyx and marble from Stone and Taney counties, Mo.

Large quantities of stone from the Duck Creek, Green Bay, Wis. quarries are being sent to Marinette for use upon the foundations of the new railroad bridge for the C. & N. W. Co., which is being built in that city.

The Bower Slate and Pencil company, of Lynnpport, Lehigh county, Pa., is a new company. Its directors are: George Bower, Evan G. Ellis, James F. Johnson, George W. Bower and C. D. W. Bower. Capital, \$125,000.

The Joliet, Ill., stone strike has been settled. The men are to be paid their old wages of seventeen cents an hour.

The quarry at Hornellsville, N. Y., is shut down for the winter. Unless an order is received there will be no work for some time.

Scientific and chemical properties as applied to that important item in construction—mortar—has succeeded in placing it foremost among materials necessary for good building. Few architects will longer tolerate the illy proportioned mass of cement, formerly left entirely to the judgment of unskilled laborers, but insist upon having the best manufactured mortar, made by the process of some established firm or company for such purpose.

NOTES FROM THE QUARRIES.

The Milwaukee Colored Lime Slate company of Milwaukee, Wis., capital, \$7,500, is a new corporation. Incorporators, H. L. Wedekind, Bernard Yahr, Henry Stamm.

Charles W. Johnson of Lewes, Del., and Enoch Townsend of Somers Point, N. J., have been awarded the contract for the United States government to blast and remove a ledge of rocks at Moosebee Beach, coast of Maine. The amount to be paid for the work is \$14,000, and operations will be begun in a few weeks.

A gentleman who has lately visited Denver, Col., says that the variety of building stone used in that city is something astonishing. Some of these stones are unusually beautiful. A buff-colored sandstone is much used, called Cone Creek sandstone. The Daniels & Fisher building is constructed of gray sandstone. Lava stone, varied with red sandstone dressings, faces the walls of the Windsor hotel. Granites are beautiful and abundant too. A gray-blue granite from near Gunnison was used in the construction of the state capitol, and the federal building rests on a gray granite from Silver Plume. A volcanic stone from Douglass county, which is found in two colors, pale purple and light red, is in favor among the better class of Denver residences. This stone is not fire resisting, but is otherwise weatherly and sound. Black lava and gray stone are occasionally worked into the houses for ornament, and some of the flagstones are made of Colorado marble. In the variety and brilliancy of its stone coloring Colorado possesses the materials for building a Western Venice.

C. H. Stanton of Goshen, N. Y., the well known railroad man, is at the head of a syndicate of New Yorkers, who recently purchased a farm near Mt. Eve, in Orange county, N. Y., that contains a large deposit of granite. They paid \$9,000 for the farm. A company has been formed with sufficient capital to operate it upon an extensive scale. A short line of railroad will be built from the Pine Island branch to where the quarries are located. Several buildings and an extensive plant will be erected at once, Mr. Stanton will have full charge of the plant and operations, which will soon be commenced. A large number of men will be employed.

Mr. Charles N. Goodwin, of Richmond, has opened a quarry at Granite, Va., and has started out with thirty operatives. He has purchased a new engine, pumps, and other apparatus, and

is going ahead quarrying some of the best granite in Chesterfield. He has a beautiful blue vein of granite in sight which he expects to develop largely. The facilities for shipping at Granite are good, as all the roads centering in Richmond have direct connections at Granite. At present there are seven large quarries at Granite, employing about 500 men, and the prospects are bright for the employment of a much larger number next year.

The Terre Haute, Ind., Stone-works Company, which has the contract for building the soldiers' and sailors' monument, has filed suit in the court of claims against the state for interest on payments not made at the proper time. The stone company was given two orders by the monument commissioners for \$10,000 and \$12,000, upon which warrants were drawn by the auditor upon the treasurer for the amounts. The complaint alleges that the first warrant for \$10,000 was not paid for 150 days, and that for \$12,000 for thirty days, and sues for the interest for that time, demanding \$500.

The granite output of Virginia for 1890 was \$332,000. Of this Chesterfield supplied at a fair estimate \$200,000 worth. The Chesterfield granite finds a ready sale at every market to which it is shipped.

The Winon Lime Company of Tehachipa, Cal., is shipping more lime now than at any time during the past season. Tehachipa lime is in demand on account of its superior quality.

A large amount of new machinery has been put in by the Anniston Lime Works at Anniston, Ala.

The granite quarry at Barren Hill, Pa., is being worked very extensively at present, and about forty people are employed.

Henry Lebo and Benj. Stump are opening a sandstone quarry on the farm of Peter German, Angelica, Pa.

Ohio's world's fair commissioner, Daniel J. Ryan, is making a tour of the state selecting one stone from each of 100 prominent quarries. They are to compose a structure which is to be erected inside the building of mines at the Columbian exposition. Each stone is to be sixty by thirty feet and twenty-five feet high.

B. B. Harris, a veteran stone man, has located a valuable quarry on the Styers farm, near Greensburg, Ind., which he will operate on a large scale. Mr. Harris claims to have discovered a beau-ideal stone.

MONUMENTAL NOTES.

William Ordway Partridge, the sculptor, has gone to Paris to complete the statues of Shakspeare for Chicago and Alexander Hamilton for the Hamilton Association of Brooklyn. He will be absent about five months.

Miss Janet Sculler, the bright Indiana girl who from the housewifely accomplishment of making medallions in butter turned her attention to work in clay, is modeling a magnificent figure of "Justice." Three years of study under Louis T. Rebisso at the Art Academy in Cincinnati and the last two under the instruction of Mr. Taft have made her ready for active and successful work as a sculptor of whom her state and country may be proud. Her "Justice" is an original conception, bearing no resemblance to the blind goddess with the scales. "A woman's idea!" a capricious critic said when looking at the design. Men wise in statecraft have declared that a woman's first unstudied opinion is more to be depended upon than all citations of the legal tomes given with forensic eloquence. From the huge atelier of the Horticultural Building, majestic brow and wide-seeing eyes, a new "Daniel has come to judgment," and Miss Scudder may be well commended for her courage in stepping out of the old paths and following a new way.

The corner stone of the monument to be erected in Raleigh to the Confederate dead will be laid May 20th.

The Blue Mountain Granite Company, of Maine, has received an order from New York for a large monument.

It is stated that just after the election in Morgan, Putnam and other counties in Indiana, the gravestones of Union soldiers were painted red. The scoundrels who perpetrated the work should be made to dangle from the stoutest limbs of the most convenient trees without preparation for eternity. An investigating board has been instituted at Martinsville to discover and punish the perpetrators of such hellish work. The grand army posts in the territory affected are assisting in the investigation.

The Savannah, Ga., police are raising funds to erect a monument to the late chief, Gen. R. H. Anderson. The monument will cost \$2,000, of which the greater portion has already been subscribed.

Several sites for the great Washington monument at Philadelphia were under discussion at the meeting of the Philadelphia Chapter of the American Institute of Architects. The result of the deliberations will probably be considered by the Society of the Cincinnati. It is understood that hopes have not been abandoned of placing the great memorial in Independence Square, but it will be many weeks before the final site is decided upon. The opposition to Fairmount Park is still as intense as ever and there is no likelihood that the monument will be placed there.

Contract for supplying the granite for the Gen. Grant tomb in New York has been awarded to the Maine & New Hampshire Granite Company of Maine, and is one of the largest granite deals of the year. It includes the granite for the tomb, the surroundings, etc., and will go from the Maine quarries of the company at North Jay, a whiter granite than that of North Conway and Redstone, where the other works of the company are located.

For soldiers' tombstones properly inscribed, two feet eight inches high, eighteen inches wide and four inches thick, Genesee county, N. Y., pays \$15.

The Warren Monumental works at Providence, R. I., are at present rushed with business.

The Gettysburg Memorial Association of Pennsylvania has awarded the contract for the Hancock monument to be erected on the battlefield to Sculptor Elwell, of New York, for \$22,000, without the pedestal. Contracts for the Meade and Reynolds statues will probably be awarded soon.

The Bowers Granite Company, Montpelier, Vt., have taken the contract to furnish a \$10,000 soldiers' monument for Port Huron, Mich. There will be three statues on it.

G—Stone.

MONUMENTAL NOTES.

The granite business at South Ryegate, Vt., is flourishing again, the orders being ahead of the help. The Ryegate Granite Works have just got the material together for the twenty-ninth monument they have made for the Gettysburg battle-field. The big stone was drawn last week, twenty-two feet long and three feet six inches square. This stone will dress about seventeen tons.

The contract for erecting the \$2,000 monument provided for in the will of the late Henry Gentry has been awarded to a Dayton, O., firm. The design is a very handsome one.

At a recent meeting of the Young Men's Democratic Club of New Orleans, a resolution was adopted to pay over the fund raised under the auspices of the club as a donation to the Jefferson Davis monument fund to the proper parties. The amount is about \$2,000.

The Exelsior Granite Company, Montpelier, Vt., are shipping a large carved sarcophagus monument to Lincoln, Neb., and another to Sacramento, Cal. They are also completing a handsome monument in form of a polished ball mounted on a pedestal for the superintendent of transportation of the N. Y. O. and W. railroad.

The Wetmore & Morse Granite Company, Montpelier Vt., is building a large tomb for J. I. Case, of Racine, Wis., and Stafford, McGlynn & Co. are making a \$1,000 column die monument for New York parties.

The C. H. Hunton Granite Company at Barre, Vt., are cutting a monument for the mother of William Cullen Bryant, which is to be sent to Illinois.

The Ames Manufacturing Company, Chicopee, Mass., have cast the bronze statue of Gen. Grant and the statue of Gen. Garfield. The figures were each cast in one piece, except the head, and came out of the mould without a flaw.

The president of the Cleveland, O., Council appointed a committee of three members of the Council to act with the director of public works in the selection of a site for the monument of Commodore Perry, and the director of public works is authorized and directed to cause the removal of the monument to the site thus selected, the expense of the removal, together with the erection and construction of an appropriate base and foundations, is to be paid from the general fund, after the money is appropriated for this purpose.

The committee having in charge the Shenandoah monument project at Pottsville, Pa., has chosen the square of Main and Centre streets as the site. The cost is to be \$5,000.

The firm of Walker & Co., La Salle, Ill., long and favorably known to the monumental trade, have added James A. Lane to their traveling force, and are now doing a larger business than ever before. The trade during the past few weeks has been far above expectations and is constantly increasing.

The Daughters of the Revolution have started a fund for a statue of Washington to be presented to France and set up in Paris.

A monument to Sir John A. Macdonald is proposed worthy of Canada. A committee has been authorized to solicit submissions of designs, restricting the work to one or two sculptors or rejecting all if thought best.

A plan for a soldiers' and sailors' monument at Watkins, N. Y., is being considered, the cost to be not over \$2,000.

The vestry of the Episcopal church at Charlottesville, Va., will erect a monument to the memory of the late Rev. J. S. Hanckel, who was for years rector of the church.

Egg Harbor, N. J., will have a soldiers' monument.

A subscription paper is being circulated at Saranac, Mich., for a \$500 soldiers' monument to be erected in the cemetery.

The funds for the soldiers' monument at Butler, Pa., are nearly raised.

Gloversville, N. Y., is raising funds for a monument in honor of Sir William Johnson.

Columbia College trustees have decided to place a monument over the grave of the late President Barnard.

Easton, Md., is interesting itself in securing funds for the erection of a monument to Robert Morris, the famous Revolutionary financier.

Berkley, Mass., has begun raising funds for a soldiers' monument.

William O' Connor, late a well-known man, will probably have a commemorative monument at Toronto, Canada.

A memorial bust of William Murdock was placed in the Hall of Heroes at the War National Monument, Sterling, Scotland. Murdock was born in Ayrshire, in 1754 and was probably the inventor of lighting by gas.

FOR SALE, WANTED, ETC.

Wanted—Some good marble setters. Apply or address DAVIDSON & SONS, Chicago, Ill.

WANTED—A man that can polish marble and cut bases; write stating wages. SALES & SEELY, Lewiston, Mo.

WANTED—Fine designs of monuments and statuary to make for retail trade. R. A. CURTIS, 14 Cyclorama Place, Indianapolis, Ind.

WANTED—Situation as foreman of quarry, by experienced, sober man; can furnish excellent references. Address Room 23, 19 Park Place, N. Y. City

FOR SALE—Sullivan Channeling Machine with boiler. Used one year. Will sell with rack, etc., complete for \$700. ROMONA OOLITIC STONE CO., Indianapolis, Ind.

FOR SALE—One-third interest in a good pink, Tenn., marble quarry in operation. Three miles from Knoxville. Address "MARBLE," Knoxville, Tenn., care Dr. B. D. Bosworth, Church street.

WANTED—Experienced marble men, with capital, to join us in opening up a fine bed of marble, located at water's edge on one of the finest harbors on Lake Michigan. For particulars, address J. C. McKEE, 19 Pearl street, Grand Rapids, Mich.

FOR SALE—One Cook, Rymes & Co. single cylinder, one drum hoisting engine and boiler; cylinder 6" diameter, 10" stroke; drum 22" x 12". Recently overhauled; in good working order. Address MACHINERY, care of Stone, Indianapolis, Ind.

WANTED Position as manager or foreman in cut-stone. Capable of taking charge of whole or any part of the cut-stone business. Fifteen years' experience. Correspondence solicited. Address, WALTER GRAVESON, 367½ W. 7th-st., Cincinnati.

SITUATION WANTED—By a number 1 marble and granite man; twenty years' experience. A position as traveler for wholesale; no objection to territory. Strictly temperate; references furnished. Address W. M. D., 591 Richmond street, London, Ont.

WANTED—Mill or factory; a stone sawing mill, for twelve gangs and two or three rubbing beds. Must be located near sand and good water power, with good shipping facilities; New England location preferred. Address CASE, care of Stone, Ind'pls, Ind.

WANTED—A first-class foreman to take charge of stone-yard, working from 30 to 40 sandstone cutters. Must be practical, energetic and experienced with plans and soft stone. Permanent situation guaranteed to the right man. Address P. S. C., care STONE.

WANTED, SITUATION—By a first-class man, as agent or manager for a building stone quarry company. Is thoroughly posted in both the sale and quarrying of stone. Fifteen years experience. First-class reference given. Would prefer the west. Address, A. W., care of "STONE."

FOR SALE—A tract of 160 acres of extra fine oolitic land, located one mile south of Bloomington, and one-half mile from L. N. & C. railway track. Stone has been fully tested, core drilled, and have begun stripping quarry; channeling to begin soon. Will sell in tracts of 20 acres more or less. S. C. DODDS, Bloomington, Ind.

WANTED, SITUATION—A thoroughly practical man of large experience in all details of marble or monumental work, would like to act as superintendent of the business for a good city or country shop; or would open up a new business in good locality, with par'y able to furnish about \$5,000 capital. Address, B. Granite, 573 Plymouth-ave., Buffalo, N. Y.

WANTED—Master Quarryman or Sup't. A reliable, practical man for our plant at Niota, Ill., on A. T. & S. F. Ry.; one with some means or credit to warrant buying an interest will do well to address us soon with full particulars, experience, and references. Ft. Madison & Appanoose Stone Co., Ft. Madison, Ia.

WANTED—A first-class soft-stone cutter, one used to piece work; none but sober, reliable men need apply. Address R. W. MATTINSON, Tempe, Arizona.

FOR SALE—A fine white lime stone quarry on easy terms; R. R. connections. For particulars address P. FRIEDRICH & SON, P. O. Box 13, Columbia, Monroe county, Ill.

SITUATION—I want position with a good firm as foreman and salesman; have had experience in mantel and building work. Address W. H. CONLEY, Charles City, Iowa.

SITUATION—With some good firm as draftsman-office manager or salesman to the trade. Am familiar with making drawings and estimating granite work. Good correspondent and bookkeeper; good references. Address DRAFTSMAN, care STONE.

WANTED—An experienced and capable man to represent and sell the product of a quarry now ready to produce a first class quality of pure white limestone in any sizes required. Quarry and mill equipped with latest machinery. Address HANNIBAL LIME CO., Hannibal, Mo.

WANTED—Situation with reliable marble and granite or cut-stone firm, by first-class, strictly sober and steady man; 36 years' experience as general workman, letterer and carver, 16 of which as foreman. Very best testimonials as to ability and reliability. Understand all branches of the stone business thoroughly. Address S. C. BRINK, 34 Carlisle ave., Cincinnati, O.

WANTED—Man of good character with thorough knowledge of machinery, to represent advertiser on the road, introducing hoisting engines adapted for various purposes. Our machines are not patented after others, but have original features, commanding them to possible purchasers. Address in strict confidence "H. E. Co.," care STONE, Indianapolis.

WANTED—Situation as superintendent or foreman by a practical man, competent to carry on the granite business in all its branches; is a statue cutter, carver and designer, has had good experience and can figure on all classes of building and monumental work. Good references. Address SUPERINTENDENT, care this paper.

FOR SALE—City Monumental Works, South Bend Ind., doing a business of \$15,000 to \$20,000 per year. A rare chance. Reason for selling our stone business has increased so that we have to devote our whole time to it. Only two shops. Population 27,332, from our last directory, just published. Address JOHNSON & MAY, South Bend Ind.

WANTED—A foreman in marble and granite department; a man who is competent to take full charge of a monumental business who is a good salesman, and who can lay off and cut inscriptions as well as superintend the business. Must be strictly temperate and of good character. Wages will not be a question to the right man. The CULVER MARBLE & STONE CO., Springfield, Ill.

Investment! **Investment!**

For Sale, Brownstone Quarry.

We have for sale a fine Brownstone Quarry, well equipped and well located; best of shipping facilities. This quarry will pay big profit. For particulars, address

CASE & PECK,
19 New Insurance Building, Milwaukee, Wis.

White Limestone Quarry For Sale.

We would like to sell or lease half interest in a splendid quarry of white limestone. Quarry nicely opened, and stone lies in uniform ledges. Have side tracks, and power sufficient to run saws for dimension stone. Our plant is located close to the southern markets, on the Newport, News & M. V. R. R. Correspondence solicited.

F. G. WILLIAMS, Sec'y,
Scottsburg, Ky.

Jamaica, N. Y., has \$5,506 toward a proposed soldiers' monument.

Some one has suggested that suitable memorial structures should be placed over the graves of Hamilton and Fulton in Trinity churchyard, New York.

Citizens of Brooklyn have signed a petition asking that the Beecher statue, now facing the city hall, be turned around so as to face in the opposite direction.

It is probable that some sort of a monument to King Massasoit will be erected at Warren, R. I. It is now thought that a rustic monument or a properly inscribed boulder will be accepted.

A fund has been raised at New Haven, Conn., to erect a fitting memorial to Henry G. Lewis. Efforts are now being made to increase it in various ways, in the expectation of making the memorial more fitting than would be possible with the sum now in hand.

A colored soldiers' monument association has been incorporated at Akron, O. The purpose is to collect funds to build a monument to the memory of the Ohio colored soldiers who fought in the late war.

The Troy, N. Y., female seminary alumni have nearly \$5,000 subscribed toward a monument to the memory of Emma Willard, the eminent teacher of women.

It is a very gratifying condition of affairs, now obtaining in the monumental trades, tending toward a development of more artistic expression in the preparation of memorials to the dead. The old idea of death, and the religious conceptions of a century ago caused men to prepare the most hideous memorials possible for churchyards. The complete humiliation of the human, the idea that man was but a worm to be crushed at the pleasure of a higher, but misunderstood power, was one of the factors in the evolution of the most revolting conceptions of a pretended memorial art.

But that is changed. The development of a better conception of humanity has led to a nobler conception of what should be used as memorials. Consequently the monument cut-

ter of to-day must be an artist, and an artist capable of tender expression in stone. It means much to the friends of the deceased to have a beautiful memorial erected over their last resting place, and the monument designer and carver who achieves the largest success must be he who caters to the artistic feeling present in all people and assists in its development.

The above was brought to the mind of the writer by a casual visit to a monument cutter's shop and seeing the many artistic carvings there and contrasting them with the horrible distortions he has seen in the churchyards in older settled portions of the country. Perhaps memorial art will yet rank with the best in the world, by this is meant that art which memorializes our dead. Statuary art is another thing and has comparatively little to do with the other.

Hawley's Patent Sand Feed

Is used by all the leading firms—saws faster and better than any other sand-feed. More gangs using our feed than any other. Easily kept in order. Over 50 gangs working satisfactorily, using either crushed steel or shot with our feed. Can give best of references.

Orders solicited.

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Specialists in Mausoleums,

Artistic Monuments and Statuary,

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"DEEP ROCK."


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Ashlar, Caps, Sills, Platforms, Etc.



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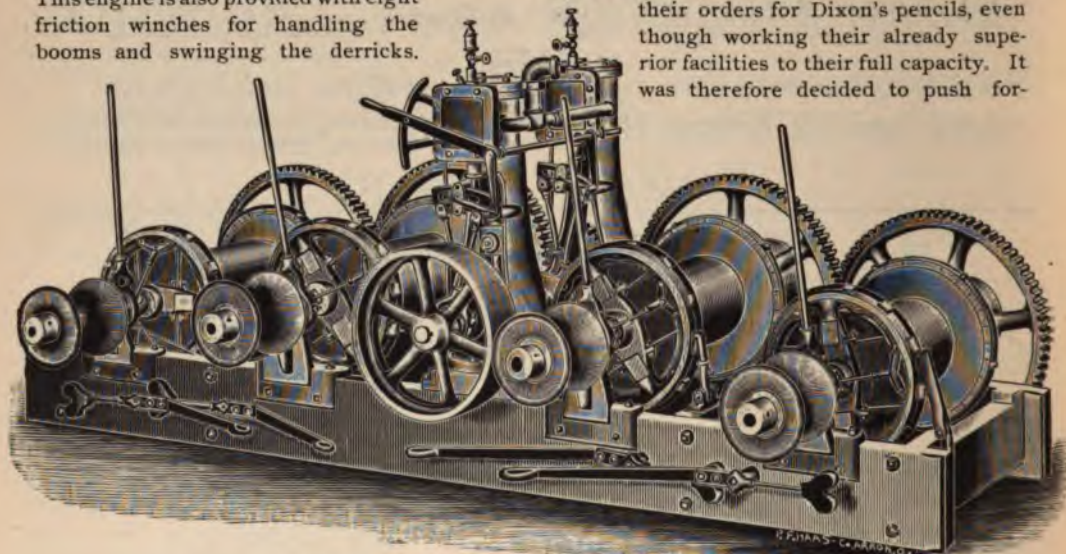
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ADVERTISERS' DEPARTMENT.

A NEW HOISTING ENGINE.

The hoisting engine shown in the accompanying illustration is a new combined double cylinder four drum engine, designed and built by The J. F. Byers Machine Co. of Ravenna, O., for the W. C. Green Co. of Chicago.

This engine has four friction drums, all operated from one side, and was built to handle four derricks, each drum handling a derrick, and one or all can be operated at the same time. This engine is also provided with eight friction winches for handling the booms and swinging the derricks.



THE J. F. BYERS MACHINE CO.'S HOISTING ENGINE.

The engines built by this company are quick-acting and of the upright pattern, cast in one piece, which is a guarantee that once in line they will always remain so, a point well to be considered by those who cannot avail themselves of the service of an experienced engineer at all times. The drums are made with wrought cylinders, and cast-iron heads. Light in weight they run true and stand the most severe tests. The friction clutch used on their friction drum is very simple in construction, easily adjusted, and has many advantages over the old-style clutch, and one of the main features is the fact

it does not absorb any of the power of the engine when applied for hoisting heavy loads and full power of the engine is required.

EXPANDING SKYWARD.

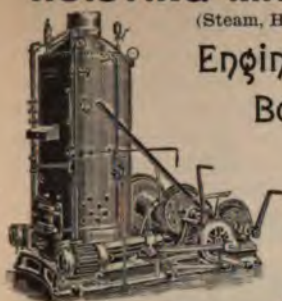
The Joseph Dixon Crucible Company, of Jersey City, manufacturers of Dixon's "American Graphite" pencils, are taking time by the forelock by putting a fifth story, 175 x 75 feet, on their pencil factory. During the past summer and fall they have been unable to promptly fill their orders for Dixon's pencils, even though working their already superior facilities to their full capacity. It was therefore decided to push for-

ward the work at once instead of waiting until spring, as intended. The new addition will be equipped with new and improved pencil machinery of their own invention. As in the great pork-packing establishments of the West, where piggy starts in as a straight pork and comes out hams, shoulders, bacon, spare-rib, tenderloins, sausage, head-cheese, pickled pigs' feet, bristle-brushes, etc., so Florida cedar and American graphite will start in, and come out of Dixon's new machinery in "round" and "hexagon" shape, "regular size" or "tablet," "full length" or "pocket," for "office," "school,"

HOISTING MACHINERY,

(Steam, Horse and Hand Power.)

Engines,
Boilers and
Crushers.



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HOISTING ENGINES of any power or style, SINGLE AND DOUBLE CYLINDER, with improved patent friction drums especially adapted for all classes of work. Single and Double Drum, friction and direct geared, link motion Mining Engines. Four, six and eight spool, lock clutch, self-propelling BRIDGE ERECTING Engines.

Double Cylinder, Double Friction Drum DOCK BUILDING and PILE-DRIVING Engines. Quick motion, friction geared COAL HOISTING Engines. Powerful compound geared Reverse link motion and friction geared QUARRY and Haulage Engines, with or without boilers. Any amount of reference given. Established 1870.

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Cleveland, O., Oct. 1, 1889.

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Gentlemen: We are running 33 gangs with your sand feed, and see no reason to change our opinion as to the superiority of your machines. They will pay the entire expense of putting them in this season.

Yours truly, THE CLEVELAND STONE CO.

Write for Catalogue and Testimonials.

FRENIER & LeBLANC, Rutland, Vt.

"carpenters'" or "artists'" use, in "satin," "maroon," "ebony," "cedar" or "natural" finish, and in the thousand and one styles in which we now have our pencils served to us. Besides this large addition to their pencil factory, the company will establish a rubber and brass plant for the manufacture of the various pencil accessories and novelties. As it was only in 1891 when the Dixon company put extensive additions on their crucible and black-lead works, and erected offices which for size and beauty are second to none in the state, it is very evident that prosperity claims the Dixon company for its own, and that the company is well offi-cered and wisely managed.

ARE YOU IN NEED OF A RELIABLE PUMP?

We call attention to The Van Duzen & Tift Co's Steam Jet Pump (see advertisement in another column of this paper). It is a unique but most effective pump—made of best brass, for all ordinary liquids; of other metal where the liquid to be pumped requires it. They ele-

vate liquids any height not exceeding fifty-five feet vertically measured, or by using two pumps, one above the other, to any height not exceeding one hundred feet vertically, elevating two hundred and fifty gallons per hour by smallest size made, and twelve thousand gallons per hour by the largest size, costing \$7 to \$75 each.

The effective force is a jet of steam so applied as to secure the greatest possible results from the steam used, and the universal testimony is that it is a wonderful pump every way. It is simple in construction, easily

operated, and does not clog nor freeze. Is used in thirty different countries, and for elevating water, syrup, molasses, still slops, vinegar, soda solutions, soap suds, salt water, beer, acids, dye liquors, tan liquors, whey, etc., etc.; mines, saw mills, flour mills, quarries, brick-yards—all use them with the same satisfactory result. Messrs. Van Duzen & Tift guarantee every pump to do

the work represented if set up and operated according to directions. It seems to us that many of our readers have actual need of just such a pump, and we shall be pleased to know that many avail themselves of this opportunity to secure one or more of them.

A PROSPEROUS CONCERN.

Messrs. James Macbeth & Company, No. 128 Maiden Lane, New York City, report a good year's business. The demand for the high class electric fuses and improved electric blasting machines made by them has been considerably larger than that of previous years, and comes from all parts of the United States. The company has made a number of improvements in their factory at Jamaica, Long Island, adding an extra boiler to their power plant and erecting several new buildings, which will give them greater facilities and put them in the best possible shape for the new year. They will hereafter make the insulating compound used in the manufacture of their electric fuses, etc., and one of the new buildings lately erected will be used for that purpose. Though this is generally the dull season, Messrs. James Macbeth & Company are quite as busy as at any other time during the year.

MILL WANTED.

The Pike Manufacturing Company, Pike Station, N. H., are looking for a chance to locate a factory, where they will employ fifty to one hundred men. They would prefer buying an established plant if at a cheap price. They require a building from eighty to one hundred and fifty feet long by forty to seventy feet wide; one or two stories high. About eighty horse-power wanted; water-power much preferred. Must be where good sharp-cutting sand can be procured cheap, and located on railroad where cheap freight rates can be had in every direction. A stone or marble mill would be near what is wanted. Any good building that they could change over so it would be suitable for their purposes would answer.

KEEPS MOVING ALONG.

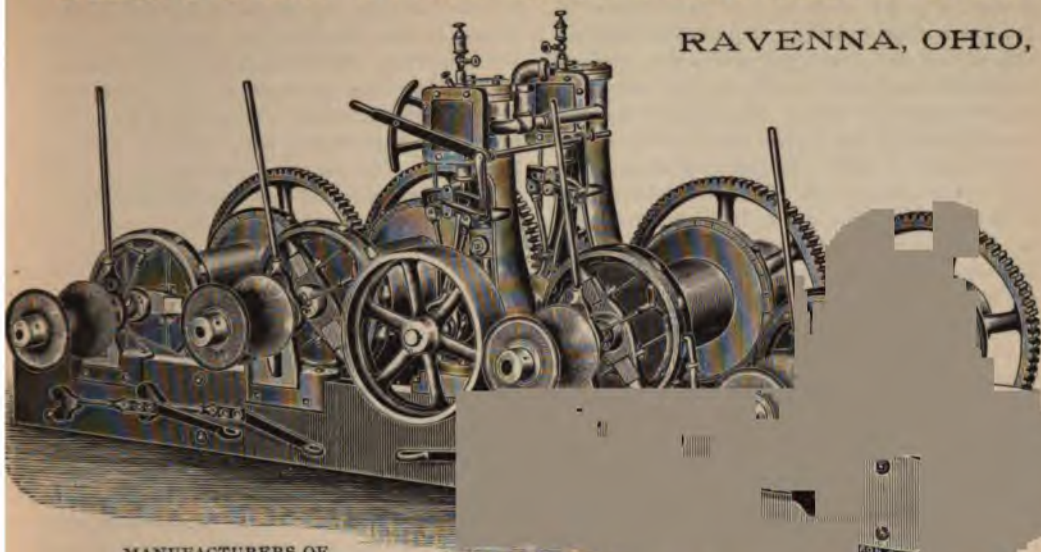
For twenty-five years D. H. Dickinson, 558-570 North Water street, Chicago, has been in the marble trade in the West, and has had the ups and downs incidental to such long service. He has put in for 1893 an unusually large supply, and is therefore in a position to respond



The Van Duzen
Jet Pump.

THE JOHN F. BYERS MACHINE CO.,

RAVENNA, OHIO,



MANUFACTURERS OF

HOISTING ENGINES


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promptly to the needs of the trade generally. He has a large finishing department well arranged and well managed, and is thus enabled to furnish anything to order in that line without unreasonable delay. He aims to meet the requirements of the dealers from every substantial standpoint, and with that end in view, has just put in a large stock of finished monuments, of the best dark and extra dark blue Rutland, in all of the most salable designs contained in his catalogue of finished work, of 1891. Dealers visiting Chicago will find it to their interest to call at 570 North Water street, where can be seen a large stock of the various kinds of Vermont marble. Mr. Dickinson calls especial attention to the fact that he can fill orders for blue promptly from this time on. Italian and Empire State marble is also kept constantly in stock. He is sending out a tasteful blotter, a valuable accessory for the desk and a tasteful memory jogger.

J. Hoadley & Son, Stinesville, Ind., who make a specialty of sawed and turned work in

oolitic limestone report recent orders for lot of balusters from Reading, Pa., also a large order for same from Ittenbach & Co., of Indianapolis, and a large mausoleum for an Illinois dealer. Oolitic stone is gaining fast as a material for monuments and interior work of buildings. The Messrs. Hoadley are skillful in their line, and well equipped for turning out work of this character.

FORGING AHEAD.

The increased demand for Lunkenheimer's brass and iron specialties and the introduction of new products has compelled the company to double their capital to \$500,000, and as soon as possible the manufacturing facilities will be increased in a similar degree. Such an addition to their already large facilities will place them in a position to give all orders a prompt attention, hitherto impossible. The company is now known as The Lunkenheimer Company, Cincinnati, Ohio.



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PENRHYN SLATE QUARRY, NORTH WALES.

(See page 104.)



STONE

VOLUME VI.

FEBRUARY, 1893.

NUMBER III.

THE CHATEAUX OF FRANCE—I.



IN studying the chateaux of France from an architectural standpoint, we should bear in mind the occasion and history which gave them existence. If we study the chateaux of earlier times, not knowing the occasion for their peculiar and picturesque outlines, we could not be in position to adapt what we see to the requirements of the present. The French chateau belonged to the period which gave it existence. It does not belong to this period. It had its distinctive use in earlier times. It has no direct connection with the present. In order to profit from the study of these structures, we must understand the cause of the development of chateau architecture and the distinctive forms which are peculiar to it.

If the problem of chateau building were presented to us without full knowledge of what has been done; if we were required, under the conditions which existed from the ninth to the sixteenth centuries, to design structures which would be both defensive and artistic, we would say the problem was absurd; that it would be possible to make structures which are picturesque, beautiful and artistic, but not defensible. Yet, in fact, such structures were built; they were well suited to the warfare of the period, and at the same time presented as picturesque and as beautiful an architecture as the world has since known. The practical conditions were never sacrificed. The primary condition was to erect structures of a character calculated to defend the occupants. It was then made interesting and artistic, but the latter conditions did not, in any sense, affect those of a more practical character. It is the history of this architecture that the necessities of defense and all practical requirements were considered first, and what is artistic and decorative in connection therewith was made subservient. It is to the fact that both these requirements were duly considered that

this architecture was successful. Hence, it is absurd for us to literally copy chateau forms into the architecture of to-day. We may consider their details, their decoration, the spirit which gave them existence, and profit thereby. Forms which were beautiful for chateaux are beautiful to-day, but are not justifiable when they are made to over-reach and limit the practical requirements of this time.

We all know that the country in which the chateaux were built was originally controlled and occupied by the Romans; that the barbarian hordes over-ran the country; that the Romans were expelled, and that from the barbarian hosts which took possession was developed a new people, a new country and new manners.

The Roman did not think of fortifying his dwelling in the fields; it was a pleasure house, surrounded by the dependencies necessary to the cultivation of the soil. "Yet it is to be borne in mind that whatever changes operate on the manners of a people, the conquerors always preserve something of the manners of those they conquer." Though the Romans, as soon as they had established themselves on the soil of Gaul, ceased to devote themselves to agriculture, they still preserved in their decadence, to a certain extent, the manners of those who had originally occupied the soil. Their habitations were located in the center of rich valleys and along the streams, and were surrounded with all that was necessary to their life and the high cultivation of the soil. They were the tranquil possessors during a large part of three centuries. Their quiet manners had affected their architecture, and their *villæ* were not calculated to resist attack. When these people were over-run by the barbarians, they abandoned their *villæ* hastily and shut themselves up in fortified towns. After the attack had passed, they repaired their devastated habitations, but through force of habit, and lack of force of character they rarely sheltered their rural homes from armed attack.

The German spirit was different: "The honor of the tribes," said Cæsar, "is to be surrounded by vast deserts; to have frontiers laid waste. The Germans regard it as a mark of valor to drive their neighbors afar; to permit no one to establish themselves near. In this way they find a means of guarantee against sudden attack." These facts are not mentioned simply for their general historic interest, but to indicate why the peculiar architecture of the time was developed. "When the tribes were transplanted to the soil of Gaul," says M. Guizot, "its habitations were still further dispersed. Heads of families established themselves at still greater distances from one another. They occupied vast domains. Later, their homes became chateaux. The villages which soon formed around them were peopled no longer with free men, with their equals, but with vassals attached to their chiefs. Thus the tribe was dissolved by the sole fact of its new estab-

lishment. The assembly of free men, where all questions were discussed, became more and more difficult to re-unite. The equality which reigned in the camps between the chief and his companions, must necessarily become effaced and was effaced at the moment when the Germanic band became established upon the soil. The chief who had become a large proprietor, had much power at his control. The other chiefs were his warriors. The more ideas of property asserted and spread among the people to that extent inequality was developed in all its effects. A king or powerful chief who occupied a vast territory distributed fiefs to his followers in order to attach them to his service, or recompense them for service rendered. The

warrior who received such from his chief lived upon it. This warrior originally had several followers; he seeks and finds more, who come to live with him on his domain. A new source of inequality."

During the earlier times, the Roman dwelling served as a type of the constructions raised in the fields by the conquerors. They were isolated structures devoted to the culture and storing of crops, the lodging of servants



(Fig. 1.)

and farmers. In the midst was the hall of the master, or perhaps, only an inclosure, in which gathered the chief and his most powerful vassals. This inclosure, opened to the sky or covered, served as a hall for fêtes or councils. It was joined to porches, vast stables, kitchens and baths. The group formed by all these buildings was inclosed by a wall, moat or simple palisade. Along the frontier or upon elevated places the Merovingian kings built fortresses but these residences seem to have been of a purely military character. They were entrenched camps to shelter an army, rather than chateaux for permanent residence, uniting everything necessary to the life of the chief and his vassals. However, these structures had their influence in forming and shaping certain of the chateaux of France. One can

only give the name *chateau* to the fortified dwellings built during the feudal period, from the ninth to the sixteenth centuries.

It was in the tenth century that the *chateau* began to take definite form, although it was not until the twelfth that it finally crystallized and assumed the forms which afterward pertained to it. On French soil the *chateau* was the definite outgrowth of Norman invasion. Previous to the coming of this race from the north, the Frankish people had lived, as said, much after the Roman fashion, in agricultural homes, each little community ruled by its chief. When the Normans first over-ran the northwestern provinces, Charlemagne and his immediate successors erected rude fortifications, which were the beginnings of *chateaux* (see Fig. 1.) At the same time the Normans built intrenched camps on the streams and at the mouths of rivers to



(Fig. 2.)

protect their booty. These also had something the character of *chateaux*. But it was not until the twelfth century that the necessities for holding the country which they had wrested from the Franks, caused the Normans to build regularly fortified *chateaux*. At the same time the necessity of protecting themselves from the

Normans on one side and from their neighbors on the other, caused the French feudal barons to erect fortifications. And here comes the distinction between the Norman and French *chateau*—a distinction which should not be lost sight of.

The Normans were invaders. They retained their hold on the country only through constant watchfulness. Their source of supply, both for food and ammunition, was the mother country. Thus they built *chateaux* which had a double purpose: The first, to hold the country and keep open the streams that supplies might be sent to them; the second, and less important, to form a means of personal retreat. The very necessity of sustaining themselves in a hostile country caused a national feeling. Their *chateaux* were all a part of a great national movement. Each Norman chieftain was a part of an organized body, who gave his services to protect the whole body and himself as well. Thus the Norman *chateaux* were similar in character because of the common cause to which they were tributary. They were built on streams that they might keep the country open, both for the reception of supplies and that those who made excursions into the Frankish country should find an assured means of retreat with their booty. The Norman Baron hardly regarded his *chateau* as a habitation. He was

rarely at home unless engaged in the active defense of his domain. At other times he was absent engaged in warfare against the French.

Along the borders of the Norman country the French baron was early obliged to give up his rural life in order to protect himself against the invaders. The necessity for defense caused him to fortify his home. The Norman system of attack gave birth, necessarily, to the French system of defense. Thus along the Norman country the French chateau is less distinctive in character than in other parts of France, although more so than in Normandy proper. All over France the barons settled where fancy led—some located on streams, in the midst of fertile country; others in mountainous country. There was no similarity of location, as in case of the Normans, who were obliged to build on the streams. Thus the French chateau must be fortified according to the needs of the particular location of each. Fortifications and defenses suitable to hilly locations had no value when applied to a chateau built on a plain. Again, the Norman baron never fortified himself against his neighbor. He felt that he belonged to the community; that his neighbor was a part with him of the nation. The French baron, on the contrary, was an independent sovereign. Little by little each small band had grown into an independent community, owing no real allegiance to the king, taking little part in affairs of state, warring each against its neighbor, from whom there was a constant attempt to take territory. Thus each baron tried



(Fig. 3.)

to make his chateau different from that of his neighbor that when he was attacked his system of defense could not be known, and the besieger be placed at a disadvantage. Each French chateau differed from all others: First, from dissimilarity of location; second, from the wish of the owner to have a system of defense known only to himself and those immediately around him.

The chateau of Arques is the best example of the Norman chateau of the eleventh century, both as regards site and defensive arrangements. It was built in 1040, by an uncle of William of Normandy, (the Conqueror) for the Duke of Arques. In the valley of Arques several kilometres from the sea, there is a chalky promontory facing southwest which is well protected on three sides by nature. It was here that this chateau, which so well shows the arrangements early employed by the Normans, was situated. Had a French baron built this structure he would have considered the valleys as a

B—Stone.

natural moat, and have used the whole space for his chateau and lower court. But the Norman dug a huge dry moat near the summit of the hill. Upon the crest of the escarpment of this moat he built the walls surrounding his chateau, leaving outside a sort of covered road six to seven feet in width protected with palisades (see A, Fig. 2.) Thus if the assailant succeeded in crossing the moat he found an insurmountable obstacle between him and the walls. A little above the bottom of the moat the Normans pierced longitudinal galleries from which they could reconnoitre and stop the work of mining. These galleries were entered from the upper court. They were so arranged that they could be readily blocked up in case they were entered by the enemy. The moat was from seventy-five to one hundred feet wide between the crest and the counterscarpe. The subterranean

passages connecting with it played a very important part in the defensive arrangements of the eleventh and twelfth centuries.

D, Fig. 2, shows the road around the moat, outside the walls, which was protected with palisades. On it the defenders could gather and wage warfare at the same time that they were themselves protected. Fig. 3 explains the location of the chateau better than would a description. On the western side the valley is deep and the escarpment very abrupt; on the village side and towards the northeast the slopes are less steep and descend to the Arques river. The flank A of the hill was protected by an exterior wall which inclosed the lower court of the chateau. This lower court formed a part of every chateau. In it were located the stables, store houses, barracks and other dependencies. If this court were taken by the besiegers, the garrison retired within the walls of the chateau proper, which

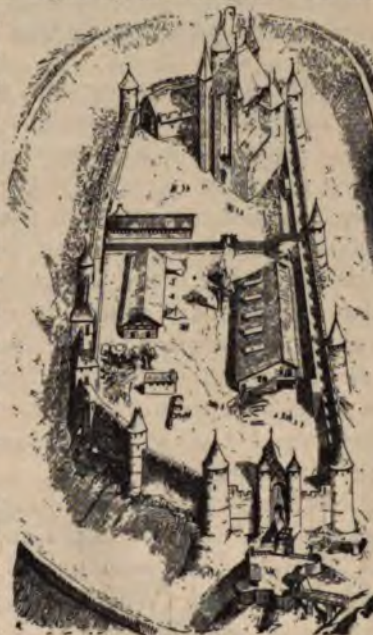


(Fig. 4.)

ordinarily did not inclose a large space and where the accommodations were so limited that they were only used in time of war.

Figs. 4 and 5 are plans of the chateau. The part marked "B" dates from the sixteenth century. In the time of its erection the moat must have followed the dotted line E E (Fig. 4.) There was probably a palisade at B to protect the principal gate. The donjon, which was square in form, was located at H. We shall consider the donjon at greater length in the next article, it being one of the most skillfully arranged of its time. K is the second gate, which communicates with the outside by means of a bridge placed on piles. From this entrance one passes under a tower and through

a long vaulted passage from which no view of the interior court could be obtained because of the oblique position of the donjon. Thus an enemy would have some difficulty in forcing an entrance through this passage which was defended as well as hidden from sight by the donjon. If he, however, succeeded in reaching the court L, the position of the donjon again made it impossible for him to reach that part of the ramparts marked M. P is a building which was dependent upon the donjon, being built over the passage from the exterior gate. It could be defended both from the outside and the interior court L. It connected with the bottom of the moat outside by a subterranean passage, and otherwise had an exit through the postern of the donjon. The donjon itself was built upon the highest point and not only commanded the court but as well the exterior on the side which was most readily accessible.



(Fig. 5.)

The chateau of Arques was hardly completed when Duke William was compelled to besiege it, his uncle having openly rebelled and siezed the territory. Finding it impossible to take the fortress, the duke built lines of contrevallation, invested the place and forced the count to capitulate for want of provisions. A chateau so strongly built and skillfully arranged as this could hardly be taken with the engines of war in use at this time. It was only with the introduction of gunpowder that such a fortress ceased to be impregnable.

Louis H. Gibson.

"Inclosed find remittance for twelve months' subscription to *STONE*, which I think is the best journal on stone interests I have seen, only I am sorry that you do not give more informarion of the stone business of the West, which, in my opinion deserves a little more interest than at present given to it. Wishing your journal all the success that it deserves, and that it may always enjoy the support of those employed in the stone interest."

—*H. F. Gruetzemacher, St. Louis, Mo.*

SLATE AND SLATE QUARRYING.

THE average quarryman, who, after months of hard labor and persistent efforts, completes to his satisfaction the initiatory developments of a slate quarry, and possesses a reasonable amount of assurance in regard to the quality and quantity of the deposit, naturally identifies himself with the possible productions of the quarry, and becomes satisfied within his own breast that he is really richer than the world estimates him. The personal possession of any object of love, affection, adoration and admiration which involves one's character for good taste and sound judgment—its value in the eye and heart of its possessor—is raised above the estimate and appreciation of other minds. The workman is justly assigned a worthy and meritorious tribute, who by his own efforts improves his individual surroundings, financially or morally. He is compelled to acknowledge to the world the beneficial results of his labors and at the same time credits himself with pride and self-satisfaction. Every avocation of life is besieged and hemmed in on every side with a net-work of difficulties, embarrassments and obstacles which temporarily appear insurmountable. When these are overcome and he perceives the beneficial results of his labors, he is forcibly impressed with the old adage, that "nothing succeeds like success." Wherever slate is found there is always in the neighborhood of such deposits quite a number of unprofitable openings, as well as a large number of abandoned quarries, which is sufficient proof that risk and uncertainty accompanies the prospector while he is prosecuting his labors, the same as if he were devoting his energies to any other calling. Slate quarries are generally opened and developed by one or two quarrymen, who are employed in other quarries, having a desire to better their condition, either by investing their savings in working a quarry of their own, or in developing it to a certain extent so that it may become marketable property, and thus realize a reasonable compensation for their labors. Their discovery is frequently one of supposition or rather of inference. They follow the direction a bed takes in a paying quarry, being well satisfied as to its course, the outcropping of the deposit they desire to open, its color, cleavage, and the separation of the seams one from the other, as they appear from surface indications. Their next point is to secure an option of a certain number of rods running in different directions, so as to make it certain that the territory thus described is large enough for all practical purposes. This option conveys to them the power or right of

search in their undertaking. It also defines the articles of agreement which sets forth all rights of matters affecting the working of the property, royalty paid the owner for roofing slate made and mill stock quarried and sold during the continuance of the lease. The royalty averages from twenty to twenty-five cents per square on sea-green and variegated, unfading green and purple bring a little higher royalty, while the red slate on account of its scarcity and the high price it brings upon the market demands a royalty which varies from fifty cents to one dollar per square. The royalty paid upon mill stock is from one-half cent to one and one-half cent per square foot. This measurement of mill stock means a slab about two inches thick with dimensions suitable for manufacturing. Stock of this kind varies according to the deposit in the quarry or quarries from which it is taken. There are a great many slabs quarried which may not measure up at the mill more than ten, fifteen or twenty feet, while in very rare cases a slab may be sent to the mill which contains eighty, ninety and even one hundred square feet. The price for royalty either upon roofing slate or upon mill stock depends largely upon the location of the quarry, its distance from railroad or shipping station or from slate mill. The quality of stock which may represent cleavages, color and texture, are also considered in making out a lease. The necessary preliminaries having been satisfactorily adjusted, the quarryman sets himself to taking off top. The surface may be composed of flint rock, mongrel slate, or of clay. The extent of the uncovering depends entirely upon the financial strength of the operator. There are producers who take off top for a year and expend many thousands of dollars before they realize anything from their expenditure. Such men know that the bed exists by having worked up to the bed in the quarry in which they may be working. The taking off top, which is really the primary work in developing a quarry, in many cases is the death-blow to the operator. His means may be limited, and after a while he may strike one of the many obstacles which constantly menace a quarryman, and he is forced to relinquish his claim and thus add one more unprofitable opening to the list. There are causes which not only effect the cleavage of slate, but some of these are liable to appear in the opening of a quarry, such as posts, bends, cramps, curls, dykes, sparry veins, etc. Most of these, however, are objections which occur in slate beds. Outward indications are sometimes very deceitful and unreliable. There is a quarry known as the Pierce quarry which is literally surrounded with abandoned quarries (and openings which never produced anything but rubbish for the dump), that has paid its owners a handsome revenue every year. These quarrymen happened to strike a pocket of slate in a section where the evidences of a profitable investment were all against them. This particular case is more of an exception than the rule in quarrying slate.

As soon as the workman reaches stock, and there being no question in regard to its soundness, preparations for quarrying are made. They look first for a joint or seam in the deposit. A hole is drilled and fired which moves out a portion of the layer bed. A free side or a free end is obtained as soon as possible, which facilitates the work not only in quarrying but also in cleaving. This bed, or rather the slate deposit, generally dips to the south or east, while the cleavage or the grain of the slate passes through the deposit at a different angle. Wherever the materials are of a fine and uniform nature, then cleavage is made perfect and straight, and is at a right angle to the dip or inclination of the strata. It will be observed by referring to the frontispiece of the Penrhyn quarry, North Wales, that its deposit is, as termed by quarrymen, "on end," or perpendicular. Shelves or landings are made at intervals of about sixty feet, one above the other, each landing being designated from the others by letters. The first landing is designated by the letter *a*, the next *b*, and so on until *o* is reached—either fourteen or fifteen landings in all. Upon each one of these landings several hundred men are employed in quarrying stock for the slate-makers. The Penrhyn is the largest quarry in the world and employs about 3,000 men. It takes



SCOTCH HILL SLATE CO.'S MILL AND QUARRY, FAIR HAVEN, VT.

its name from its owner, Lord Penrhyn, who obtained the royal title of lord from Queen Victoria on account of his marriage to the queen's cousin. Lord Penrhyn is now dead and his vast estate is in possession of his son. Work in this quarry is considered hazardous,

and is carried on under difficulties. The men who are employed upon the upper landings, which are a long distance from the pit, are made secure by a rope either fastened around the body or leg. Shanties are also erected to protect them from flying rocks or stones while blasts are being made.

The slate deposit in the quarry of the Scotch Hill Slate Co., Fairhaven, Vt., is in nearly a horizontal position, dipping a little to the east. This is a purple quarry, and is devoted mainly to manufactured stock.

There are both general and specific methods which are adopted in all

slate quarries, such as pillaring, plugging, and feathering and scalping, which terms properly mean cutting with the grain, and also moving of stock without blasting. It frequently happens that a bed is so located that it is possible to channel upon the sides that are not free. Channeling saves a great deal of stock, but is very slow and tedious, and requires a great deal of personal effort on the part of the quarryman who is compelled to cut a trench in the stock with the ordinary jumper.

Stock which is produced from slate quarries, that portion of it which is sent to the slate mills, is generally cleaved to a suitable thickness (two inches), and is manufactured and devoted to a large variety of purposes.

In the manufacture of roofing slates a block is raised from the quarry and is placed in close proximity to the building occupied by the slate-makers. This block is either sawed across the grain or it may be broken by one of the slate-makers so that a certain sized slate may be made from it. It is then split into pieces about two inches in thickness. These slabs are then passed to the second slate-maker, who cleaves them as thin as the quality of the slate will permit.

A hundred slate set upon edge and packed closely together should occupy twenty-two (22) inches in space. Where the cleavage is imperfect the slate-makers do not obtain more than three or four slates to the inch. A slate-trimmer which cuts the slate into regular sizes is indispensable, and is always found in every slate-maker's building. In cleaving slate down to the proper thickness there may be a blind seam or some obstacle which breaks the slate. This piece is cut with the slate-trimmer into a smaller-sized plate. For instance, the block is first designed to make 24x12. Defects may occur so that they may get a few 24x12, or a few 20x12. The sizes of slate vary from 12x6 to 24x18. The most salable sizes commence at 20x10 and run to 24x18. Allowing three inches lap, when laid, there are 533 pieces in a square of slate which measures twelve inches by six inches. In 24x18 there are seventy-six slates to the square. A square of Vermont slate will weigh about six hundred pounds. In order to furnish a yard so that there is a sufficient number of slate on hand to make sales from it will be necessary to have at least 100 different sizes of slate, and a car-load is fifty squares of each size. At W. H. Lloyd's quarry, near Fairhaven, Vt., which is devoted exclusively to purple roofing-slate, a gang of three men will make fifteen squares of slate per day. The annual output from this quarry is about 8,000 squares, which will average in price from \$4 to \$4.50 per square. The crushing strain of Vermont slate, which has been tested by F. R. Hutton, M. E., of New York, of stock taken from the Fairhaven Marble and Marbleized Slate Co.'s quarry, shows the resistance to be 12,870 pounds to the square inch. This slate is stronger than any other slate quarried, and possesses a greater hydraulic resistance than any other

stone excepting granite. The durability of Vermont slate cannot be determined, from the fact that the first slate which were quarried forty-six years ago, and the first buildings which were slated from these slates about the same time, are in as good condition to-day as they were the day they were first placed upon the roof, with the exception of an occasional breakage.

There are slate quarries devoted to roofing slate entirely, while there are other producers who manufacture mill stock and also roofing-slate.

The illustration which accompanies the current issue of *STONE* of the quarry owned by Jas. Minogue and Thos. Greer, shows a large slab two inches thick, and five by six feet, which is fastened to the incline and is on its way to the mill to be manufactured into a billiard bed. This quarry produces enough stock so that about 30,000 feet pass through the mill every month, and they also manufacture from 250 to 300 squares of unfading green slate monthly. This firm also manufactures all the billiard beds used



THE "EVERGREEN" QUARRY, FAIR HAVEN, VT.

by Collender & Blake, manufacturers of billiard tables, New York. There is from thirty-six to thirty-nine feet of slate in a billiard set, and it requires from 275 to 325 set monthly to meet the orders from this firm. The name of this quarry is the Evergreen, which rightly adapts its name to the surroundings, it being located in the midst of a pine grove where the scene is always enchanting whether in summer or mid-winter. Being situated at the head or northern extremity of the Mettowee Valley, the view from this

point is one of the most beautiful throughout the slate belt. This firm are now engaged in filling an order for Chili. They, in common with other firms throughout the slate belt, having become well satisfied in regard to the superiority of the Vermont slate, are willing to place their goods in competition with any foreign article of a similar nature. Foreign demand for colored slates has gradually increased within the past four or five years, so that at the present time this branch of the slate industry has become a matter of considerable importance.

Since the "tide in the affairs of men" have changed, it may be proper to mention the first slate quarries developed in the Vermont and New York slate belt, and at a time when the people of New England were entirely dependent upon foreign markets for slate. In a previous communication in this journal it has been stated that the first quarrying in Vermont was done by Col. Alanson Allen, of Fairhaven, in 1839. In 1847 Mr. Allen commenced the manufacture of roofing slates. In 1848 F. W. Whitlock, of Castleton, Vt., opened a quarry in that town about forty rods north of the north line of Poultney, and in the vicinity of a quarry opened afterward and called the Eagle quarry. In 1851 Daniel and S. E. Hooker opened the first quarry in the town of Poultney, Vt. In 1852 John Humphray opened the Eagle quarry, near Hydeville, Vt., and E. D. Jones opened a quarry in the same vicinity. In 1853 the Eagle company was incorporated and commenced the manufacture of roofing slate under the superintendence of Dr. Goldsmith. W. L. Farnam & Son opened a quarry in 1853, and in 1860 Mr. Griffith Hughes opened the "Evergreen," previously mentioned. The year 1860 seemed to be prolific in opening and developing quarries. Six were opened in that year. The increase was slow—about three or four new quarries being added to the list every year up to 1872—when there appeared to be a decided change, and quite a number of new quarries were included in the list that year. The product of the slate quarries did not amount to but very little previous to this time on account of the slow methods of quarrying. But very few if any of the modern mechanical appliances were in use at that time.

The pioneer who commenced active operations in developing slate quarries forty or fifty years ago is worthy of a great deal of credit for his foresight, his indomitable will, sagacity and perseverance, and yet it must be admitted that the prosperity of the slate industry has been developed within the past twenty years. The demand for slate-makers and quarrymen from the old country or from Wales appears to be greatly in excess of the supply. A slate-maker in Wales receives about \$1.00 per day wages, while the laborer performing the same labor in this country gets \$2.00 for the same time. A family which consists of a man and his wife and five children arrived in this country last Fall. The husband and two boys were given work at the

"Eureka" quarry. The first month's labor revealed the fact that the second boy, who was only ten or eleven years of age, had earned more as a signal boy in this country than his father had earned in the same time as quarryman. The father, in the meantime; had more than trebled the wages he had received in Wales.

The importance of the slate industry and the magnitude of its trade is demonstrated in the large number of orders that are being received from foreign markets. The export trade has nearly doubled in the past two or three years.

The annual output of roofing slate throughout the slate belt of Vermont is between three and four hundred thousand squares. Vermont produces a greater variety of colored slates than any other State, while the output of her milled stock is larger than any other State.

Geo. H. Harris.

ADULATES AN ABUSED ANIMAL.



CONTRARY to the general opinion it is possible, even under ordinary circumstances, to make a favorable mention of the much-abused quadruped, the donkey. While the horse is full of pride, impetuosity and odor, the donkey is mild, humble and patient, and too often bears with resignation the most cruel treatment. Abstemious in its habits, it is content with the coarsest herbage which other beasts will not even touch, such as thistles and weeds.

The donkey carries the heaviest weight in proportion to its size of all beasts of burden; it costs little or nothing to keep, and requires no care so to speak. It is a most useful auxiliary to the poor man, especially in ragged, mountainous countries, where its sureness of foot enables it to go where horses could not fail to meet with accidents. The illustration which accompanies this is a fair representation of the docility and affection of this animal.

Geo. H. Harris.

TENNESSEE MARBLE AND THE CONGRESSIONAL LIBRARY BUILDING.

A MEETING of marble producers of East Tennessee, in answer to a call issued by Col. J. E. Hart, was held at the Scheubert hotel, Knoxville, Tenn., January 25, 1893. The meeting was called to order by John M. Ross, and on motion Col. J. E. Hart was elected chairman, and Chas. M. Funck, secretary. Those present were as follows: John M. Ross, representing J. M. Ross Quarries; D. D. Nicholas, representing the Columbia Marble Co.; J. Ed. Ross, representing J. Ed. Ross Quarries; T. S. Godfrey, representing Grey Knox Marble Co. and Stinette Marble Co.; J. Oelig Brown, representing Seaton Marble Quarries; J. J. Craig, Jr., representing Tennessee Producers' Marble Co.; W. B. McMullen, representing Loudon Marble Co. and Southern Monument Co.; J. E. Hart, representing Concord Quarry Co.; J. E. Willard, representing Evans Marble Co. and Champion Marble Quarries; Ed. H. Eaton, representing Republic Marble Co.; Chas. M. Funck, representing East Tennessee Stone and Marble Co.; Chas. B. Ross, representing Warham Quarries; John Knox, representing Knox Marble and Railroad Co.

Mr. Hart then read a paper stating fully and concisely the object of calling the meeting, which is as follows:

GENTLEMEN—We have come together this evening not alone as marble producers, but as American citizens, to discuss a question that has been prominent before the public for the past two weeks—a question in which every American is concerned whose patriotism is not outweighed by his hopes of personal gain—namely, the question of the policy the government has adopted in the selection of the marbles to be used in the construction of the new Congressional Library at Washington. The policy referred to in this instance appears to be directly at variance with its long-established custom of using only home-grown and manufactured material in all its work of internal improvement, and so good and valid does this custom seem that we are deeply anxious to find some satisfactory reason for its departure from it in the present instance.

From the statements recently published by the newspaper press of the country we learn that contracts for marble to the amount of \$638,000.00 have just been awarded for the interior finish of the said library building, and that of this vast sum American marble is only given the insignificant amount of \$38,000.00, while the remaining \$600,000.00 goes to enrich the foreigner. This appears to us to be an unwarranted and unjustifiable discrimination against our domestic marbles. It appears the more unjust and wrongful when we consider the policy that the government has pursued in almost every other instance in regard to the construction of all its great works. Our great warships, for instance—now conceded by all to be the finest and most formidable vessels afloat—are absolutely the product, from stem to stern, of American skill and American material. There are no foreign metals or woods in their make-up. They are American ships, in the fullest sense of the word, and as such are the pride and glory of the nation. Yet, there is greater reason why foreign metals should be used in the construction of these ships than that foreign marbles should be used in the erection of our public buildings. Foreign metals are no doubt equally good and much cheaper than the American product, and on the score of economy alone there would be some justification for their

use, while the foreign marbles far exceed in cost the domestic article, and we confidently claim are not so good. In saying this our words are designed to convey their full import.

We claim that the American marbles are superior to the foreign for building and decorative purposes, and we challenge the men who made these specifications to a test of the relative merits of each, for the purposes named. We claim that our marbles are sounder, cheaper, more durable, more beautiful and in greater variety than the foreign, and are capable of being so arranged by skillful architects as to produce the highest artistic effects. They are harder and finer grained, will take a higher polish, and are not subject to the stains and defacements of the softer and more porous foreign marbles. Again, we claim that the colored foreign marbles are notoriously unsound, and that whenever they are used to cover extended surfaces that said surfaces become but a patchwork of fractured stone, held in place by some cementing material. But, gentlemen, in no local or narrow sense do we present this subject to the public and ask their attention. We come on a broader and higher plane, and claim that as American citizens we have been ignored by those Government officials in whom the power was vested to select the materials that entered into the construction of this building.

What we would like to know is whence came the authority, whence the right to deny to American merchandise the privileges they have conceded the imported article. This they have done in direct opposition to a governmental usage so old that it has become to be regarded with all the force and effect of law. Our duty to ourselves and every American producer demands of us that we shall not sit idly by without protest and witness this outrage. We do raise our voices in earnest protest against, and call upon not only the marble producers of the entire country but upon every producer of home-made materials, of whatever kind, to unite with us in asking that the light may be turned on and that we may know why these things are done.

Col. Hart then read an editorial from the January number of *STONE*, the leading exponent of the stone industry of the United States, which severely condemned the action of the authorities in this matter, and setting forth the superiority of American over foreign marbles as exemplified in the Indiana state capitol.

On motion the chair appointed Messrs. Godfrey, Ross and Eaton a committee on resolutions, who reported the following:

"The quarrymen of marble in Tennessee assembled in convention at Knoxville upon January 25th, 1893, by unanimous vote passed and adopted the following resolutions:

Be it resolved by the Quarrymen of Tennessee Marble, That the secretary transmit to each senator and representative in congress a copy of the following petition and protest against unjust discrimination in favor of foreign marbles:

To the Congress of the United States: 1. Whereas, this convention has learned with equal indignation and regret that in the recent letting of contracts for interior decoration and finishing of the congressional library at Washington, \$600,700 worth of foreign stones were required to be furnished and only \$38,600 worth of the products of American quarries were permitted by Architect Green and Chief of Engineers, General Casey, to compete for acceptance for said building; and 2. Whereas, the discrimination thus made in favor of foreign stone is unfair, unjust and un-American, in view of the facts that American quarries can furnish at equal prices stones of superior quality, durability and color; and 3. Whereas, American quarrymen are thus excluded from competition with the products of foreign quarries in furnishing material for a national American building, and are thus injured by an implied judgment that foreign stones are superior to the products of American quarries.

Now, therefore, the quarrymen of marble in Tennessee, on behalf of themselves and the marble producers of the United States of America, respectfully represent that in the matter of the specifications for the congressional library at Washington, American quarrymen and marble producers have been treated with unfairness and injustice. We confidently assert that America can furnish decorative stones and marble for all interior finishing superior to the products of any foreign quarries. We pledge ourselves to verify this averment before any commission of experts, or committee appointed by congress, and we respectfully but most earnestly protest against the acceptance for use in an American building erected by the American Government, of foreign stones which are inferior in quality, texture, color and durability to American marbles obtainable at

equal prices, if fair and open competition were allowed. Exercising the constitutional right of petition, we respectfully request that a congressional committee of inquiry be appointed to ascertain the reason (if there be any reasons) for the exclusion of American quarrymen from the opportunity of bidding upon contracts for material for an American public building; and furthermore, that congress be requested by proper resolutions or legislation to require that in letting contracts for material for buildings erected by the United States, an equal chance for competition shall be given to the products of American quarries when they are equal to foreign stones. *Resolved, further*, That the secretary transmit a copy of these resolutions to each senator and representative in congress, and to every quarryman in the United States of America.

Signed, T. S. GODFREY,
JOHN M. ROSS,
ED. H. EATON,
Committee.

Mr. Craig moved they be adopted as a whole and the committee discharged with thanks.

Carried by unanimous vote.

The secretary then read letters bearing on the subject from the following gentlemen: Congressman John C. Houk, of Tennessee; Congressman B. A. Enloe, of Tennessee; Congressman Thos. B. Reed, of Maine; Senator Redfield Proctor, of Vermont, who had been written to on the subject by Mr. T. S. Godfrey, and all promised to do what they could to bring the matter before the authorities at Washington.

Mr. Craig moved a committee of three be appointed by the chair to correspond with marble producers of other states advising them of our action and requesting their coöperation in the matter. Carried.

The chair appointed J. O. Brown, J. M. Ross and D. D. Nicholas.

Mr. Godfrey moved the chair appoint a committee of one on finance and to act as treasurer. Carried.

The chair appointed Mr. J. Ed. Ross.

Mr. Craig moved that an assessment be levied on each of the eighteen quarries that had been notified of the meeting, so as to raise funds to meet the necessary expenses. Carried.

Mr. Godfrey moved to adjourn subject to the call of the president. Carried.

The following letters from Senator Proctor and Representative Houk are interesting:

UNITED STATES SENATE, WASHINGTON, D. C., Jan. 20th, 1893.

DEAR MR. GODFREY:—Your letter received and is exactly in accord with my sentiments. I went some months ago to Gen. Casey who has charge of the library, and to Mr. Green, the superintendent, and submitted this view. I found they were very much set on foreign marbles. I did not claim or care for much use of the product of the Vermont Marble Company, because I did not think there was much we could furnish to advantage, but I did urge strongly the American idea that to go abroad for our fancy marbles looked like official condemnation of our own product, and this country afforded varieties that were suitable for any interior building, and that the building ought to have in its different rooms a good assortment of the best varieties. I think your proposition an excellent one to do what we can to work up a sentiment in favor of American products. The marble, or anything else we have, is as good as the world affords. Suppose you should have copies of your paper sent to every representative and senator. I will show the copies you sent me to Gen. Casey and Mr. Green, and show them that

without any consultation your view was precisely like mine, and that it was a view that would have a good deal of force if properly agitated. I found them very firmly set in their way, and insisting they could not get "the effect" they desired with American product, but it will be a pleasure to me to do anything I can to show them they are mistaken. I intend to be in Knoxville on my way South after the adjournment of congress and hope to spend two or three days and look over the marble product there. I remember meeting you pleasantly and going to Concord some years ago. Very truly yours,

REDFIELD PROCTOR.

T. S. GODFREY, Esq., Knoxville, Tenn.

U. S. HOUSE OF REPRESENTATIVES, WASHINGTON, D. C., Jan. 21, 1893.

T. S. Godfrey, Esq., Marble Dealer, Knoxville, Tennessee:

MY DEAR SIR:—Immediately upon the receipt of the marked copies of the Knoxville papers charging that the authorities in charge of the construction of the congressional library were unjustly discriminating in favor of foreign marbles as against native marbles I addressed the following communication to the Secretary of War:

Hon. Stephen B. Elkins, Secretary of War, City.

DEAR SIR:—I would most respectfully call your especial attention to and invite your immediate consideration of the inclosed clippings from the Knoxville, Tennessee, *Daily Tribune*, of January 8th, and the Knoxville, Tennessee, *Daily Sentinel*, of January 13th, in each of which the supervising architect is charged with having unjustly discriminated in favor of foreign marbles as against native marbles in the construction of the new congressional library. I would also respectfully request that after you have carefully considered the contents of these clippings you would advise me, if it is consistent with your wishes, whether there is any foundation for the charge, or put me in possession of the facts, from which I can draw my own conclusions. If the charge be true, it seems to me, to say the least, that a more patriotic supervising architect ought to be employed, and if the charge is false he should be vindicated. I know nothing about the matter, and have no special interest in it, but I would like to become possessed of the facts in the case in order that I may present them to my constituents, who are largely interested in the marble industry, and some of whom, it seems, were very desirous of furnishing marble for the construction of the library. I shall publish any reply you may see fit to make. I am informed the library is being constructed under the direction and supervision of the war department, and for this reason I address you. If I am mistaken, please return this letter and inclosures at an early date.

After I had sent this letter I sent the following telegram from the house of representatives on January 21st, to the honorable secretary of war.

"Please, if practicable, give me an immediate answer to my recent letter with regard to the purchase of marbles for the congressional library."

On the same day after I had sent the above telegram, I learned from Congressman Grout, of Virginia, that the law authorizing the construction of the congressional library, gave the supervision of its building to Gen. Casey, the chief of engineers of the United States, and that the secretary of war had nothing to do with the matter. I thereupon sent the following telegram from the house of representatives to the honorable secretary of war;

"The letter I addressed to you concerning the purchase of marbles for the congressional library, should have been addressed to General Casey, chief of engineers. Please refer letter and telegram to him at once."

This, I am informed, was done. As soon as General Casey makes his reply, or after a reasonable time has been given him within which to answer my letter, I shall take such steps as may seem proper. All the Tennessee members will gladly coöperate in the effort to develop the facts in the case, whether it be by a resolution in the house of representatives to appoint an investigating committee, or otherwise. With the light before me it seems that a gross wrong has been committed by the authorities in purchasing \$600,000 worth of foreign marbles and only \$38,000 worth of native marbles, and the matter, if necessary, should be investigated by a special committee of congress. Any and everything the Tennessee delegation can do to right the wrong will be done.

I would have introduced a resolution before now to investigate the purchase of marbles for the new library, if I had been conversant with all the circumstances of the case, and held the opinion I now hold, but having only one side of the case—that of the native marble dealers—I thought it the best part of prudence to get the other side of the case as near as possible before doing so. Before taking any steps in the house of representatives, I will consult with my friend and colleague, Brother Enloe. As soon as any new turn in the matter occurs, I will advise you.

Very truly, your friend,

JNO. C. HOUK.

STONE PRODUCTION—VI.*

MARYLAND.

GRANITE, limestone, marble, and slate are produced in this state.

Granite.—Twenty-two quarries in Baltimore, Cecil, and Howard counties were operated in 1889, producing an output valued at a total of \$447,489. Of this amount Baltimore county yielded stone valued at \$223,070; Cecil, \$219,863; and a smaller amount came from Howard county. The granite quarry at Fort Deposit has won a wide reputation for the satisfactory stone produced. Throughout the mass of this granite, as it occurs in the quarry, seams occur at intervals from about one-half inch to a number of feet, and while they are discernible only by an experienced eye, they are very valuable in the operations of quarrying and can be opened readily by means of wedge and feather. They frequently reveal a perfectly level surface, ready at once for use in building without the intervention of the stone-cutter. The expense of preparing the rock for use in the wall is accordingly reduced. The stone is very hard, takes a beautiful polish, retains its color, and can be gotten out in enormous blocks, larger, indeed, than it is advisable under ordinary circumstances to handle. It was used in the construction of the piers of the Baltimore and Ohio railroad bridge across the Susquehanna river near Perryville, and has given entire satisfaction in this work.

Sandstone.—Sandstone was produced in this state in 1889, in Allegany and Frederick counties, in small amounts, the total value of the product of the state being valued at only \$10,605. The Potomac Red Sandstone Company is operating sandstone quarries on the Potomac river, about twenty miles above Washington, in Montgomery county. This stone has been quarried since 1884, but for a period of nine years previous to that date there was no production. This production was originally known as Seneca red sandstone. It has been used in quite a large number of buildings in Washington City, notably the Smithsonian Institution. From all the evidence which has been submitted, it appears to be one of the best red sandstones in the country. Many of the strong and unqualified indorsements of this stone appear as the favorable result of an investigation of a committee of Congress appointed to investigate the use of this stone in the construction of the war, state, and navy department buildings in Washington.

*Report of United States Geological Survey for 1889-90.

Limestone.—Ordinary limestone from thirty quarries was produced in 1889 to an amount valued at \$164,860. The productive counties were the following: Baltimore, \$102,350; Frederick, \$38,296; Washington, \$15,184; and much smaller amounts from Carroll, Allegany, and Howard counties. The great bulk of the product was used in the production of lime, which was valued at \$148,432. The remainder was used for building and street work, and to some extent as a flux and in bridge and railroad work.

Slate.—The slate product of Maryland comes from what is known as the Peach Bottom region, in the northern part of Harford county, where there were five quarries in operation in 1889. They produced an output valued at \$110,008. For a more detailed description of what is known as the Peach Bottom region and of the slate produced from it, see the report on Pennsylvania in this series.

Marble.—The production of marble proper is limited to Baltimore county, at a number of points in the vicinity of Baltimore, along the Northern Central railroad. The total value of the output in 1889 was \$119,675. In Harford county green serpentine was quarried from a single locality. While this is by no means marble in constitution, it is nevertheless used for purposes to which marble is continually applied, and it therefore enters into competition with marble in the market. This stone is an exceedingly valuable one for purposes of interior decoration and furniture tops. The quarry was opened in the year 1880, and has been in operation ever since that time.

The following is an analysis of Harford county serpentine made by Dr. F. A. Genth, of Philadelphia.

ANALYSIS OF SERPENTINE FROM HARFORD COUNTY, MARYLAND.		Per cent.
Silicic acid	40.06	
Alumina.....	1.37	
Chromic oxide.....	.20	
Nickel oxide.....	.71	
Ferrons oxide.....	3.43	
Manganous oxide.....	.09	
Magnesia.....	39.02	
Water.....	12.10	
Magnetic iron.....	3.02	
Total.....	100.00	

The specific gravity of the stone is 2.668; hardness, four on a scale of ten.

William C. Fay.

[TO BE CONTINUED.]

IF STONES COULD SPEAK!

IN the Piazza della Signoria at Florence stands the great Fountain of Neptune. It is the work of the sculptor, Bartolommeo Ammonato, and in Florence, is, perhaps, more generally known as the "Fountain of the Giant." Gigantic, indeed, even to the extent of seeming too large for its surroundings, is the figure of the old god, represented as he is, standing in his chariot and drawn by great sea horses. The Neptune was cut from a huge block of Carrara marble, which, if stones could speak, might tell us a story of such heartburnings; such strivings and contentions; such malice, hatred and an uncharitableness, as was surely seldom raised about the possession of any block of marble which was ever quarried.

It was in the middle of the sixteenth century, in the time of the younger Duke of Cosimo, that news was brought to Florence of a wonderful block of marble which had been quarried at Carrara. It was said to be without flaw, or blemish, twenty feet in length, and nine and a half feet in width. Here was a treasure, worthy indeed of the attention of a duke, even of a duke of Florence. First among the Florentine sculptors, Baccio Bandinelli, obtained knowledge of the find. He lost no time, but, at once posted to Carrara to secure it. He found the owner of the block, paid him fifty crowns as earnest money and then returned to Florence, to entreat the duke to complete the purchase and to intrust him with the cutting of a great statue from it. At last he so far succeeded in his efforts as to receive instructions to prepare a model for a new fountain which it was resolved to place in the great piazza. But months, and even years went by, and the matter progressed no further. Possibly the models did not please the duke, or it may have been that Baccio failed to give the business due attention, or perhaps the duke was too much occupied with pressing affairs of state. Be that as it may, certain it is that for a long time nothing more was heard about the great block, or the masterpiece which was to be cut from it.

But after long and patient waiting, the Carrara quarry owner at length grew tired of the delay, and made a journey to Florence resolved to be either paid for his block, or to be off with his bargain. He had, he said, many demands for smaller blocks of marble, and he would cut up the great block forthwith, unless he was promptly paid for it. This threat brought the duke to terms: he paid for the marble and directed that it should remain at Carrara to await his pleasure. The news that this great block was not the exclusive property of Bandinelli, but that it had been purchased by the

duke, soon reached the ears of the other Florentine sculptors, who at once bestirred themselves in the matter. Benvenuto Cellini especially made a strong appeal to the duke begging that models might be sent in to compete with those of Bandinelli. In the history of his life he quaintly tells us that he did this "not through any envy to that artist, but moved to compassion for the destiny of the unfortunate marble." Eventually it was decided that Benvenuto Cellini and Bartolommeo Ammanato should both send in models which should be compared with those of Bandinelli and that the block should be given to the sculptor who made the best model.

At this Bandinelli was furious. It was he who had secured the block in the first instance, it was his business, and with him no one had the right to interfere. He appealed to the duchess and seems to have gone great lengths to secure the powerful aid of that gracious lady. He presented her with pictures for her palace, a grotto for her garden, and a beautiful figure for her fishpond. In the end she secured for him permission to go to Carrara to bring the block to Florence. As soon as Baccio reached Carrara he set to work upon the marble, and cut it about to suit the design which he had himself prepared, in the hope that this would make it impossible for the model of any other sculptor to be selected, in preference to his. But Benvenuto was not to be so easily overcome. No doubt he had friends at Carrara from whom he obtained news of his rival's doings. He appealed to the duke and declared that Baccio was deliberately spoiling the block out of spite so as to render it impossible for a good work to be made out of it by anyone. This resulted in the recall of Bandinelli to Florence, and the contention between the sculptors became more and more bitter. Benvenuto attempted to win over the duchess to his side. He obtained an interview with her and adroitly turned the conversation on the works which he had in hand. One of these was a crucifix, wherein the figure was of the finest statuary marble, and of life size. Benvenuto valued this work at 2,000 ducats, and offered it as a present to the duchess if only she would promise to observe a benevolent neutrality. But Bandinelli's powerful ally remained true to him and told his opponent that she would have none of him or his works for it seemed that he valued neither her interest nor her opposition. It was in vain that Benvenuto declared that he knew very well the consequences of both or he would not have offered to give away a work which he so highly prized. The lady was not to be moved and at last left him in anger.

At length the much-coveted block arrived in Florence, and the three sculptors set to work on their models. As to the exact details of what followed we are somewhat in doubt. Benvenuto tells us that his model won the prize and that Bandinelli died of vexation in consequence. Vasari says that the influence of the duchess secured the block for Bandinelli who thus

triumphed over his rivals, only to fall a victim to a malady which caused his death after eight days' illness; It is probable that the latter is the true version, as Benvenuto himself admits that upon hearing of the death of her favorite the duchess declared that she had befriended him during his life and would continue her regard for him even after his decease; for though Bandinelli was no more, she would take good care that the marble should never pass into the possession of Benvenuto.

And the duchess was as good as her word; for although Benvenuto sent petition after petition to the duke, begging for the marble, eulogizing himself and his models, and praying that justice might be done to him; his labors availed him nothing, for the end of it all was that the block was given into the hands of Bartolommeo Ammanato and out of it that artist carved the great Neptune. "O ill-fated stone," says the disappointed Benvenuto, "hard indeed was thy lot in falling into the hands of Bandinelli; but it is a hundred times more deplorable, now thou art in those of Ammanato!"

Arthur Lee.

"STONE" AS A LUBRICATOR.

A good friend from Vermont sends us the following: "A Vermont druggist was called upon to 'put up' a quantity of the oil of stone. The druggist looked over the different works of pharmacy, the dispensatory and other works treating on materia medica without any avail. It occurred to him that petroleum was a mineral product coming from a rock, he naturally concluded it was the crude oil which was wanted for the patient. Like the greater portion of medical names, the oil of stone is a duplex or subserves a purpose in different forms. As an illuminating agent STONE itself is probably the greatest promoter of scientific knowledge of the nineteenth century."

"I am very much pleased with STONE and wish you to kindly keep on sending it to me."—*E. T. Vielt, Charleston, S. C.*

"I think STONE is a very good paper for anyone that wants to keep himself posted on the stone trade."—*Louis Gavard, Sault Ste Marie, Ont.*

"We concede STONE is well worth the money."—*J. W. Furnas & Son, Omaha, Neb.*

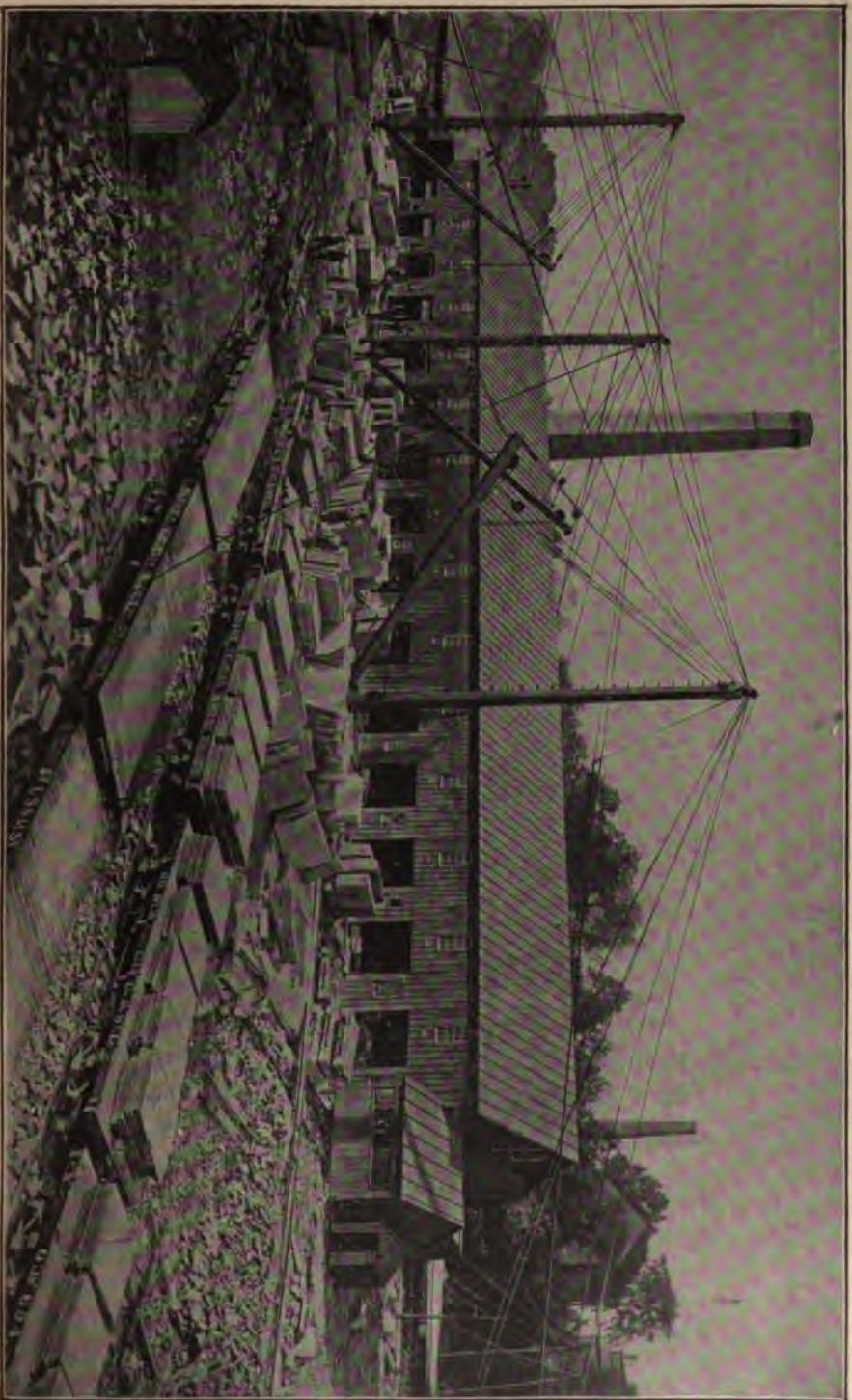
SANDSTONE INTERESTS OF NORTHERN OHIO—IV.

WHAT geologists term the "Berea" district comprises a great deal of territory and is occupied by a number of quarrying companies. Berea proper, however, knows but one operator and that the Cleveland Stone Company recognized as the largest producer of sandstone in the United States. This company was incorporated under the laws of the state of Ohio, in July 1886. It has a paid-up capital of \$2,250,000; commenced business August 1, 1886 when it purchased the quarries and business of the following concerns: Berea Stone Co., J. McDermott & Co., Clough Stone Co., Worthington & Sons, James Nicholl, Nicholl & Miller, Columbia Stone Co., Ohio Building Stone Co., Ohio Grindstone Co., Berea & Huron Stone Co. Since that time, it has absorbed the quarries of L. Haldeman & Son, Atlantic Stone Co., Lake Huron Stone Co. and several smaller concerns. For about a year after its organization, the following were its officers: Wm. McDermott, president; J. M. Worthington, vice-president; George H. Worthington, secretary and treasurer; James Nicholl, F. M. Stearns and Michael McDermott, superintendents.

The latter part of 1887, the McDermotts and Stearns retired from the company, and since that time, James M. Worthington has been president; John Huntington, vice-president; George H. Worthington, secretary and treasurer; James Nicholl, general superintendent; George A. McArthur, assistant secretary, and E. A. Merritt, auditor and assistant treasurer.

The general offices of the company are in the Wilshire Building, Cleveland, O., where, in addition to the officers named, and Mr. C. W. McCormick, secretary of the building stone department, there are employed twenty-eight persons, including cashier, purchasing agent, accountants, bill clerks, stenographers, telegraph operators, city agents, etc.

The Berea quarries were first opened in 1830. For ten or fifteen years, nothing but grindstones were produced. The business has steadily increased ever since until at the present time, they are the largest sandstone quarries in America. In 1871, there were about fifteen different companies engaged in the business. In that year, they were all merged into The Berea Stone Company with the exception of J. McDermott & Co. These two concerns becoming owners of all the available quarry property in Berea, continued in business until the Cleveland Stone Company was formed and brought them out. Since that time, the latter has purchased fifty acres of quarry land there adjoining the property previously acquired. Berea is



No. 1, Sawmill, Berea, Ohio.
15 gangs. Daily Capacity about 4000 cubic feet.



Quarry No. 8 of the Cleveland Stone Co., at Berea, Ohio.

situated on the main line of the Cleveland, Cincinnati, Chicago & St. Louis R. R. and also on the main line of the Lake Shore & Michigan Southern R. R. The stone company now operates eight quarries there. Railroad tracks run into all of them. In the sixty-two years that these quarries have been operated, about $73\frac{1}{2}$ acres have been quarried out. The Cleveland Stone Company now owns $151\frac{1}{2}$ acres of stone on which no quarrying has yet been done. Up to the year 1889, the depth of rock usually taken out was only twenty-four feet, when, by boring, it was discovered that there were sixty-three feet of good merchantable stone below the level to which the quarries had before been worked. From these facts, it will readily be seen that the Berea quarries are inexhaustible. The Stone Company has a private telegraph wire connecting its general offices in Cleveland with the office in Berea and from the latter, it has telephone lines to quarries Nos. 2, 3, and 4. The product of Berea quarries consists of building stone, sawed and split flagging, curbing and grindstones. In these quarries, there are at present employed six hundred and seventy-five men, forty-six steam derricks, forty-six steam hoisters, nineteen boilers, sixteen engines, twelve channeling machines, eighteen steam drills, eleven steam pumps, six grindstone turning lathes, one saw-mill containing six gangs of saws, one saw-mill containing eighteen gangs, and another mill, fifteen gangs. Ten of these gangs have screw feeds, and the rest, box balance feeds; one forty inch turbine water wheel, one grindstone frame factory, complete electric light plant for illuminating all the mills at night, and a large machine shop containing lathes, planers, shapers, etc., etc.

Ira P. Rowley,

Artist-Editor STONE.

CURIOUS PETRIFACTIONS.

Mr. Frank Wood, of Albany, Ore., writes to STONE, as follows, concerning some curious petrifications disclosed in his quarry: "I have read lately an article on the theory of high tides as a factor in sedimentary formation of stone, at a time when the moon was very near the earth. In my quarry I find vegetable fossils or petrifications that are remarkable and would be a fine study for botanists. Most of them are of tropical plants, such as cane, palms, etc. I find cane from one to twelve inches in diameter with the joints perfectly marked. I find no sea shells or marine fossils. It certainly is a very peculiar formation."

"Could hardly get along without it."—*Chas. Schmidt & Bros., Grand Rapids, Mich.*

THE ONYX DEPOSITS OF CAVE CREEK, ARIZONA.

IN this journal for December, 1891, was given an account of the so-called Big Bug onyx quarries located some twenty-eight miles southeast from Prescott, Yavapai county, Arizona, and which were at that time in process of development. Since then the writer has visited two other deposits of similar material, one not many miles distant from the Big Bug quarries, and the other on the peninsula of Lower California. A description of the latter is reserved for a future paper; here I shall refer somewhat briefly to the so-called Cave Creek deposits, which were discovered at about the same time as those of Big Bug.

The Cave Creek quarries lie in the extreme southern part of Yavapai county, near the Maricopa county line. At present they are most readily accessible from Phoenix, but over a road the latter twelve to twenty miles of which is hilly in the extreme. In riding over it one can but be reminded of a saying in reference to the territory to the effect that "if Arizona'd been laid flat, she'd be bigger'n any two states or territories in the Union." To reach the market the stone must be dragged on wagons the entire fifty miles of intervening roadway to Phoenix, and thence shipped by rail. With this severe drawback, coupled with high freights imposed by a railroad free from competition, the quarries labor under great disadvantages.

The country rock about Cave Creek is a slaty schist injected with quartz porphyries and diorites, all overlaid by basaltic lavas. The main onyx ledge lies on the western slope of a low basalt-capped hill. The lowest underlying rock, as exposed in the creek bed a few rods below the quarry is also basalt, but of a coarse texture and gray color. In the quarry opening the lowest rock exposed is a calcareous breccia formed of fragments of slate and pebbles of basic eruptive rocks imbedded in a cellular travertine. At the time of the writer's visit (August, 1892) the outcrop as exposed by digging was some 200 yards in length, and presented some remarkable and interesting features. The maximum thickness of the solid bed was about ten feet. As exposed this bed was not, however, continuous, but evidently had in part been pushed out of place and more or less shattered and broken, presumably by earthquake shocks attending the extension of the basalt.

The prevailing colors of the onyx here, as at Big Bug, are green and yellow with veins of ochreous brown and red. The tints are beautiful in the extreme, and leave nothing to be desired in this respect; the best quality of the stone is undoubtedly fully equal to any now upon the market. Blocks

of any large size, clear, uniformly green throughout, are not obtainable, owing to the prevalence of abundant intersecting red veins, which add greatly to the beauty of the stone. There is a large amount of waste material in the stone thus far removed, owing to the irregular shape of the blocks as quarried and to the oxidation of the included ferrous carbonate which has here gone on nearly as extensively as at Big Bug. There are also occasional included masses of chalcedonic quartz which are a severe detriment. Whether these features are persistent throughout the bed, future quarrying alone can decide. The deposit is unique in that, so far, it has yielded blocks whose largest dimensions are across the grain, *i. e.*, at right angles with the plane of deposition. Slabs several feet in diameter can thus be had, and while by this method of cutting the beautiful blending of the colors is lost, still the wood-like grain, or onyx-like banding is thus brought out to the best advantage. At date of writing, nearly all the material thus far quarried has been liberally dug in the form of irregular corroded detached blocks of comparatively small size, from the soft tufaceous material. The large bed though exposed has not been touched; what it will yield and how far it will extend into the hill is yet to be ascertained. The best that can be said is that the prospect is excellent for obtaining a considerable amount of excellent stone; further exploitation can alone tell how much. There are absolutely no surface indications from which one can foretell with any degree of certainty as to the amount of good stone the quarry can be made to yield.

George P. Merrill.



WASHINGTON, D. C., CORRESPONDENCE.

THE records of the government in reference to the imports and exports of marble and stone and kindred lines, indicate more accurately than anything else could, the condition of the business the United States does with foreign countries in these branches of trade and industry. Through the courtesy of officials in the treasury department, your correspondent has been permitted to make the following condensations of facts relating to these imports and exports, during the month of November last, the latest period for which these official statements have been compiled.

The dutiable imports of marble, and manufactures of same, in November reached a valuation of \$71,479, against \$69,668 imported during the month of November last year. These imports for the eleven months ending with November, amounted to \$928,234, against \$722,891 imported during the corresponding period of the previous year.

The dutiable imports of stone and manufactures of same, slate being included in this classification, amounted in November to a valuation of \$58,303, against \$41,685 in November last year. The imports for the eleven months closing with November, were worth \$482,842, against \$458,378 during the corresponding period of the previous year; making the total value of the imports of marble and stone, and manufactures of same, during November \$129,782, against \$111,353 during November last year, and \$1,411,076 during the eleven months ending with November, against \$1,181,269 during the same period of 1891.

The exports of American marble and stone, unmanufactured, amounted to \$12,668 in November, being a falling off in these exports, from those of November last year, when \$16,934 worth were exported. During the eleven months ending with November \$142,669 worth was exported, against \$157,609, during the corresponding period of the year before.

The exports of roofing slate in November, reached \$2,753, compared with \$3,290 exported in November '91. These exports for the eleven months ending with November, indicate a slight diminution from the figures of the corresponding period of 1891, being \$41,757, against \$65,114.

The exports of all other manufactures of marble and stone during the same month, amounted to \$40,757, indicating an increase over the business of the same month last year, when \$37,680 was the value of the exports. For the eleven months ending with November these articles were worth \$486,141, compared to \$441,981, being the value of the exports during the

eleven months ending with November 1891; making, therefore, the total value of the exports of marble and stone, and manufactures of same during November, \$56,178, against \$57,907 during November last year, and \$670,567 for the eleven months ending with November, against \$664,704, within the like period of the previous year.

The re-exports of marble and manufactures of marble, in November, amounted to only \$111, against \$63 in November last year. The re-exports for the entire eleven months ending with November, were worth \$1,400. The re-exports of stone, and manufactures of same, including slate, for the eleven months ending with November, did not exceed \$500.

According to the official figures of the census bureau, recently compiled in reference to St. Louis, it is seen that there are in that city forty-four marble and stone-working establishments, beside those of monuments and tombstones. These forty-four concerns represent a capital of \$403,119, and employ an aggregate number of hands of 495, to whom are paid \$347,102. The cost of the material used by these establishments is placed at \$581,769, and the value of the products at \$1,186,060.

In addition to the foregoing, there are twenty-three concerns manufacturing monuments and tombstones. These represent a capital of \$273,115. These plants give employment to 190 people, to whom are paid annually, \$121,268. The cost of the materials used, is placed at \$147,506, and the value of the products at \$355,417.

The census also reports four establishments manufacturing slate, marble, and marbleized mantels, representing a capital of \$72,460, employing sixty-seven hands, and paying \$48,053 in wages. These four concerns turn out products amounting in value to \$99,810, the materials used costing \$36,470. The census bureau does not pretend to state that these figures cover the entire industry in St. Louis, along these three lines, as many establishments decline to make any reports whatever. But the figures, so far as they go, the bureau claims, may be taken as a reliable index to the condition of these three lines of trade in that city.

United States Consul Simons, at Hongkong, in a recent report to the state department, concerning the trade and commerce of Hongkong, states that there are 103 granite quarries in the provinces, in which Hongkong is situated. During the year of 1891, \$18,200 worth of stone was quarried. With this statement in view, it is reasonable to conclude that American manufacturers of quarrying tools and appliances, should find in Hongkong a profitable market for their manufactures. The consul says that he is convinced that many mechanical tools of American manufacture, will find a ready sale, if the Chinese were once convinced of their utility and their economy. He says, however, that this can never be accomplished by means of the policy hitherto followed by most American manufacturers, of flooding

the country with descriptive circulars and illustrated catalogues. The one thing needful above all others to convert the splendid possibilities of the future into a remunerative certainty, is personal introduction of these mechanical devices, and patient explanation of their advantages by intelligent agents, and the custom once secured, can only be retained by absolute integrity and fair dealings on the part of the American merchant, as the Chinese are shrewd traders, and their confidence in an individual dealer once shaken, can never be regained.

E. A. O.

THE OLD STONE MILL AT NEWPORT.

THE quadri-centenary of the landing of Columbus at one of the West India islands, has caused renewed attention to be given to what are claimed to be, with more or less probability, proof of the pre-Columbian discovery of America. The advocates of the discovery of our continent by the Norsemen again put in evidence the old stone mill at Newport, and, like many of their predecessors, claim that the building was erected by Scandinavian immigrants to this land 500 years before Columbus was born. With the question of the discovery of the New World by Norsemen, I do not propose to meddle at present. My only object is to show that, as a piece of testimony in favor of such discovery, the old mill is worthless.

If the tower was standing when Rhode Island was first settled, it would have been a work of so great wonder as to have attracted general attention. Newport was founded in 1639, and in none of the early documents is there any mention of the Old Mill. There was no tradition concerning it among the people, but it was universally referred to as a windmill, showing for what purpose it had been used. It is positively known that the structure, during the eighteenth century, served both for a mill and a powder house. It is first distinctly mentioned in the will of Gov. Benedict Arnold of Newport, in which it is called "my stone-built windmill." Had it been an ancient monument, Dr. Danforth, in 1680, or Cotton Mather, in 1712, would not have failed to mention it.

The first house in Newport was built by Nicholas Easton; but he makes no mention of the Old Stone Mill. In 1663 Peter Easton wrote: "This year we built the first windmill," and in 1675 he wrote, "A storm blew down our windmill."

Benedict Arnold must have been a very popular man in Rhode Island, for he was several times governor, the last time from 1677 to 1678. He came from Providence to Newport in 1653. He built a home upon a lot of sixteen acres, the eastern part of which includes the mill. Gov. Ar-

nold died in 1678, aged 63 years. His will is dated Dec. 20, 1677, in which he says: "My body I desire and appoint to be buried at ye northeast corner of a parcel of ground containing three rods square, being of, and lying in, my land, in or near the line or path from my dwelling house, leading to my stone built windmill, in ye town of Newport above mentioned." Edward Pelham, son-in-law of Gov. Arnold, in his will dated May 21, 1741, in a bequest to his daughter, Hermæoine, mentions: "Also



[We present herewith, through the courtesy of the *American Miller*, an excellent engraving of the old mill.]

one other piece or parcel of land situated, lying and being in Newport aforesaid, containing eight acres or thereabouts, with an old stone windmill thereon standing, and being and commonly called and known by the name of the mill field, or upper field." In 1834 Joseph Mumford, then being eighty years old, stated that his father was born in 1699, and always

spoke of the building as a powder mill, and he himself remembered in his boyhood, or about 1760, it was used as a hay mow.

In the foregoing citations it will be observed that Gov. Arnold does not call the building an "old" mill, but my "stone-built windmill". At the time that Pelham made his will, the structure had been standing not less than sixty-five years, and hence he very properly designates it as "an old stone windmill."

Besides the documentary testimony there is the evidence derived from the mill itself. The mortar is composed of shells, sand and gravel. In the year 1848, some mortar taken from an old stone house in Spring street, built by Henry Bull, in 1639, some from the tomb of Gov. Arnold, and some from various other buildings was compared with the mortar of the old mill, and found to be identical in quality and character.

The poet has very fittingly said of the attempt to Norseize the old Newport mill:

Alas! the antiquarian dream is o'er
Thou art an old stone windmill—nothing more.

J. P. MacLean in American Antiquarian.

THE FORMATION OF TRADE CENTERS.

TRADE centers change, and history as yet furnishes no example of their commercial perpetuity. The marts of ancient commerce had their rise and fall, and where the wealth and enterprise of remoter ages had their centers, they are now but a mortuary reflection on the changing nature of times and trades. Their glory has departed as the nations to which they belonged crossed their meridian and sank below their horizons, and the converging of activities and commerce kept in parallel lines with progress and civilization. These historic and commercial currents are as active as ever, making their deployment continuously as population makes its exodus here and there on the seas and shores of the old star. The map of the future will probably be run on the old lines, and as modern civilization has as yet homesteaded but a fraction of the world, the redistribution of trade centers will in a general sense be a perpetual canvass. The idle or empty dock, the silent factory and the empty house will go on making their silent history of commercial and industrial transfer, and of migratory populations moving in steady column along the track of empire. Since the discovery of the Western hemisphere the nomads of industry have made a western march; later on it will head its way to lower latitudes and spread its broad human wave over adjacent archipelagoes and the fringes of Asia and Africa. This is inevitable, and is practically beyond political evasion or legislative direction. No nation can make

a private park of the world or isolate its own destiny from the rest, and till the tramp of progress is heard from the poles to the equator the redistribution of commerce as well as empire will be in process.

In a national sense, and as bearing on the destiny of American cities, we are witnessing a continental phase of a world-wide fact. Trade centers are in a state of transit, and those of respectable longevity and well-earned commercial renown have in some instances filled out their waistband and reached the limits of maturity. Trade has followed population. The manufacturer has traveled with the census and industry developed with the crowd. Men with foresight have been in touch with the situation, and migrated industries are strung along the latitudes of the country. In the occupation of new territory we have developed certain centers of trade from which, as spokes from the hub of a wheel, production radiates along railroads and waterways, and commercial destiny is practically assured. In this coterie of productive and distributive centers, we see a special place and future for St. Louis, Chicago and St. Paul, in each of which the facilities for distribution are geographically determined. This factor, in connection with the proximity of abundant raw material, will continue to be the final authority in grading our commercial centers, and will probably guide the decisions of our future city builders in locating the trade centers of the future.—*Mississippi Valley Lumberman*.

RESERVE POWER.

IN the feverish life of to-day the tendency is to make exhaustive efforts in every direction of human activity, disregarding the advantages of keeping some power in reserve. This is very noticeable in the mechanical world. New works may be started with reserve machinery, to be put in service only in case of accident or breakdown, but as business increases the reserve will be called into daily use until ultimately it becomes a part of the regular plant, and work is carried on at a high pressure until the collapse comes and then the need of a reserve is sadly felt. Locomotives are built to do a certain amount of work, with reserve power to be exerted in making up lost time. But the weight of trains is increased and the schedule quickened until there is no longer any reserve, and delays and accidents compel the adoption of a new class of engines of greater power, whose reserve is similarly used up by the development of railroad demands. Men use themselves with as little judgment. They undertake work which leaves them time and reserve power to spend in recreation and in personal care of their families. But the demands of business lead them unwisely to encroach upon their hours of leisure. They exhaust themselves by their labors, and when sickness or accident befalls them they have no reserve power with

which to recover. The tendency of the times is to push everything and everybody to the utmost limit of endurance, as in the recent military race in Europe, where noble horses were sacrificed that their riders might win.

Men are admired for what is recognized as their reserve power, that is to say for making no greater effort than is necessary for the accomplishment of a reasonable purpose, and yet very few people take the lesson home to themselves and endeavor to govern their own conduct in the same way, while some in the effort to do so mistake indolence for rest and degenerate into slothfulness. It is much easier to estimate the power and capacity of a machine built of iron and steel than one constructed of muscles and nerves, yet the safe limit of work even for a man can be pretty accurately determined—the limit beyond which he should not go. His power beyond that would be a reserve power at command in an emergency or furnishing the nucleus for gaining new strength when he should be stricken down by illness or accident. He should guard it carefully, instead of drawing upon it daily as so many do who become feverishly anxious for success in some undertaking, whether of money-making or social or political advancement. The successful athlete carefully measures his resources, and if his career is to be a long one, nurses his reserve powers. If he engages in a race he does not over-exert himself at the start, but so regulates his expenditure of energy that he shall have an abundance left for the finish. That is precisely what men should do who are engaged in a similar contest daily extending over a long period of years. Every man, high or low, who labors daily is engaged in a long race, which is in part a test of endurance. He should so measure his pace as to have always at command some reserve power for a spurt. He should not undertake to do more than he can do regularly without undue fatigue, and then he will be able to do more, for a short time at least, when occasion requires the extra exertion. Just as we see the swift runner exhausted before the race is half over, and beaten by his slower but more enduring competitor, so we see men in business and in public life overtaxing their powers when young and growing old and feeble, while young in years. It is the reserve power that tells in prolonged contests—the reserve power of muscle, of spirit, of money, it may be—for he who exhausts himself in any kind of effort is unable to withstand the slightest added burden and succumbs to a force he might easily have resisted if he had kept his resources well in hand.—*Boston Journal of Commerce.*

TRANS-ATLANTIC NOTES.

THE granite workers of Aberdeen seem to be fairly satisfied with the result of last year's working. There seems to be a general opinion that profits have been small owing to the severity of competition, but the volume of trade has shown a tendency to increase. During the past year the value of worked granite monuments, exported to the United States, was something like £67,000. It is said that one American agency alone, established in Aberdeen, has shipped monuments to the value of £24,000. About two-thirds of American orders are finished in Swedish and Norwegian granite, of which Scotland has imported a considerable quantity. In all, last year's imports into Aberdeen of Swedish and Norwegian granites amounted to 7,000 tons. A small granite of dark gray Quincy granite also found its way into the market. This has been worked up and reexported, principally to Canada, but it does not seem probable that an extensive trade will be developed on these lines.

Every year a number of granite cutters leave Aberdeen to settle in the United States. These seem attracted to the higher pay which is to be obtained in America. The movement generally takes place in the spring; and during the early months of last year about 120 men left Scotland to try their fortune across the Atlantic. But the strike, which took place last May, checked the outflow of Scotch labor, and some of those who had emigrated found their way back again to their old quarters. The standard rate of pay for stone-cutters in Aberdeen is now six and one-half pence (thirteen cents) per hour for men engaged in the monumental trade, and seven pence (fourteen cents) per hour for men engaged in the building branch. For the polishers the pay averages from four pence to six pence per hour.

The home trade during 1892 was very steady. The demand for building stone was fairly brisk, as there seems to be a growing tendency to adopt polished granite in building elevations. In this department of trade the outlook for the coming year is a good one. But the trade in granite for street paving purposes is in a most depressed condition, and there is little prospect of improvement. There is keen competition with the producers of French and Welsh granite, for the small amount of trade doing, and the demand has fallen off principally as a consequence of a more general use of wood as a paving material. Granite workers are looking forward to the failure of wood, in the hope of reviving the demand for granite paving;

meanwhile they have to be content with a very small proportion of the business which was once done in this particular item.

The increase in use of granite as a building material has set the producers of the softer building stones upon their mettle. This has been especially the case with the owners of the Bath stone quarries. The oölite which is found in the neighborhood of Bath is extensively employed for building purposes all over the country. To meet the objections which have been raised to the weathering capacity of their stone, the quarry owners have adopted the French system of "fluatation," with most successful results. The operation is very simple. Fluat is in the form of crystals which readily dissolve in cold water. The solution is applied to the surface of the finished stone with a brush. It has a chemical affinity for lime, and as soon as it touches the carbonate of lime which is in the stone, it sets up a chemical action which transmutes it into an insoluble, and, therefore, imperishable substance. The surface of the stone is thus rendered proof against the action of the atmosphere, even in manufacturing towns where acids and other impurities fill the air.

The system has also been usefully employed by marble workers, who are looking to fluatation as a means to increase the employment of marble for out-of-door purposes. Hitherto the trying character of the British climate has been one of the principal difficulties with which the marble worker has had to contend. As a decorative material in-doors marble has held the field, and the past few years have witnessed an enormous development in this direction. One of the latest marble palaces which has been built in London is the new Junior Constitutional Club. Some stir has been made by the English marble workers because Belgians were brought over to fix the work. It is probable that some attempt will be made to raise political capital out of the fact as the club happens to be a political venture, but the organization among the English marble workers is too weak for any serious difficulty to arise; especially when the failure of the Dublin strike against imported work is borne in mind.

A well-known Dublin sculptor imported a few Italian-worked monuments. The Dublin Stone-Cutters' Society sent him notice that they would withdraw their men from his employ if he retained the foreign work, or imported any more of it. He at once retaliated by "locking out" all his society men, and now says he has enough applications for employment to dispense with society men altogether in the future. In a communication made to the public press, he complains of the action of the stone-cutters and states that during the past two years he has done work at home to the value of £4,300, and that during the same period, his trade in Italian work has only totaled £23.

If all marble men could tell the same tale, trade in Carrara would be in a

bad way. As a matter of fact, the Italians have still a very fair share of the world's trade in marble. At the present time one of the principal works in hand there is a \$10,000 altar job, destined for one of the churches in New York, and there is no lack of less important orders. It has become the fashion for some American sculptors to take orders for work upon your side of the Atlantic, to journey to Italy, and produce it there by means of Italian labor, and then to return to America with the finished work to place it in position. It is said that this mode of procedure pays if the work is of sufficiently important character. It is one of the latest developments in the marble trade.

Another innovation which has been inaugurated by a Hungarian firm is the substitution of marble beds for billiard tables in place of slate. It is now over half a century since slate superseded oak for that purpose. It is said that marble billiard beds are not only better but have also the merit of being cheaper. There is no difficulty in obtaining single marble slabs of the full size of the largest billiard tables, and does away with the risk of inequality which is always present when three or more slate slabs are used. The marble for the new billiard beds is not polished, it is merely dressed and carefully ground.

If marble billiard beds come into general use, it will make some difference to the slate trade, which is just now in an unwonted state of prosperity. The past year is said to have been the best which British slate quarry owners have had since 1876. The price of roofing slate has been raised again and again, but at the same time the demand has kept up, and stocks at the quarries have been greatly diminished. Prices have now reached a point at which it should be profitable for American slates to be imported. Between 1876 and 1880 a considerable trade was done in the exportation of American slates to Great Britain, but the drop in prices which then took place shut them out. The English market is not worth the attention of American roofing-slate producers. The sizes which are most valuable on this side are 24x12, 22x12, 22x11, 20x10 and 18x10.

Arthur Lee.



SCULPTURES IN THE SAND.



IN the January, 1892, issue of *STONE* was presented a faithful reproduction of some curious sculpturing in the sand of a railroad cut on the Monon route, near Delphi, Ind., executed by Harry C. Milroy, the son of a neighboring farmer, accompanied with an article descriptive of the sculptor and his work. The wide interest manifested in the article reprinted as it was in many papers, including art journals, has prompted us to reproduce some of the young sculptor's later work, which shows a marked improvement over that originally done—due doubtless, to the further instruction in the art institute of New York city. A discouraging feature of his work has been the treacherous character of his material, and while by selecting a lower strata of sand in the railroad cut near his home, he would find it sufficiently caked to permit the use of a case-knife, his only carving tool, yet the weight of the mass of earth overhead would create a miniature avalanche were the carvings recessed to protect them from the elements. To avoid a "cave in" necessitated careful engineering and considerable labor, and in this Mr. Milroy received the assistance of the employes of the Monon route, under orders from the officials of the road, who have taken a warm interest in the work of the sculptor and extended him every courtesy possible, owing to the picturesque attraction he has provided for patrons of this popular route. Passengers en route from Chicago to Indianapolis are courteously informed by the train men of this interesting feature, and as the train leaves Delphi are permitted to disregard the rules of the company and gather upon the platforms to view the curiously wrought characters in this unstable material. We present herewith a portrait of Mr. Milroy, who was born in 1868, on the farm through which the railroad passes, and which he has never left except for the purpose of attending to his art studies in the east. He has now attended two terms and shows marvelous proficiency in anatomical figures. He remained self instructed, however, up to two years ago and the sketches and paintings embellishing the farm house bear evidence of remarkable genius considering the early environments of the youthful artist.

"We are very highly pleased with *STONE* since it has taken the magazine form and wish to be placed on the list as a constant subscriber."—*Superior Cut Stone Co., West Superior, Wis.*



D. H. RANKIN - PUEBLO



D. H. RANKIN - PUEBLO

DECADENCE OF AMERICAN SHIPPING.

THE following circular has been addressed to many citizens, whose replies are sought with the hope that a remedy may be found:

TREASURY DEPARTMENT, BUREAU OF NAVIGATION,
WASHINGTON, D. C., January 10, 1893.

SIR:—I transmit to you to-day by mail, under another cover, a statement of the status of American shipping engaged in foreign commerce, to which your attention is respectfully invited, the same being a part of the annual report of the Commissioner of Navigation.

This statement shows that the American tonnage engaged in our foreign commerce fell from 71.56 per cent. of the total tonnage entered at ports of the United States in 1856 to 20.61 per cent. so entered in 1892. The value of merchandise imported into and exported from the United States in American vessels fell from 73.7 per cent. of the total value of imports and exports in 1856 to 12.3 per cent. during the fiscal year ended June 30, 1892. According to a statement of the postoffice department the government paid for the sea conveyance of United States mails to foreign countries, for transatlantic service during the last fiscal year, \$449,405.19 to foreign lines and only \$3.48 to American vessels.

Thus it is seen that the condition of our shipping engaged in foreign commerce is too serious to admit of delay in applying some effectual remedy for its restoration. The alarming decadence of American shipping is mainly attributable to the single condition of cheapness of labor and material on the side of the foreigner. The question arises, in what way can this condition be modified or counterbalanced so that American ship owners may secure to the American flag at least one-half the tonnage engaged in our foreign commerce.

The receipts from passengers and freight carried in foreign vessels in the trade between the United States and Europe is estimated to be about \$200,000,000 a year. It would seem that for purely commercial reasons, aside from national or sentimental considerations, some measure should be adopted which would give to American capital and enterprise an equal opportunity to cope with foreigners in our foreign commerce. But our navigation interests involve still higher consideration as an instrumentality of national defense. It is proposed to adopt a policy which will at once fulfill the demands of an American merchant marine and of a naval reserve.

I therefore respectfully request that, as a leading citizen in a large way identified with the commercial interests of the country, you will kindly offer me some suggestions upon this important national question. I am, sir,

Respectfully, yours,

E. C. O'Brien, Commissioner.

I have replied from a business and patriotic standpoint that I think the best measures for the restoration of American supremacy in the foreign carrying trade would be, first, absolute free trade in all foreign material required in the construction, outfitting and supplying of American built ships; second, liberty to buy or construct at any foreign port or shipyard, ships to sail under the American flag, thus putting home and foreign shipbuilders on an equal competing basis, encouraging American capital to enter the foreign carrying trade; third, preference to American ship owners at equal rates in carrying the mails; fourth, require officers and crews of American ships to be native or naturalized citizens of the United States. Any dis-

crimination against foreign ships, made for the purpose of equalizing the higher cost of constructing or operating American ships, becomes to the extent that such discrimination can be measured in dollars and cents, in rates of freight or passenger transportation, an indirect tax on agriculture, manufactures, and commerce of our whole country, for the benefit of only a few American ship owners. No special reservation of governmental right to take and use merchant vessels in case of need is required. If the need comes the government has the supreme right to every species of property as well as to the services of every citizen.

The pamphlet referred to is an interesting synopsis of the rise and decline of American shipping, with remarks showing that the commissioner looks only to protection and restriction to restore our supremacy, whereas, I look to freedom of competition to bring about the desired result more speedily and on a grander scale. As long as wooden ships only were used our unrivaled forests and energetic merchants pushing for trade on every sea gave us the supremacy evidenced by the percentage of seventy-three in the year 1856, but with the introduction of iron, and later of steel steamers, from which American shipbuilders were practically barred by our tariff, followed a few years later by our civil war, during which ship-building, except for war purposes, was paralyzed, sufficiently accounts for the decadence.

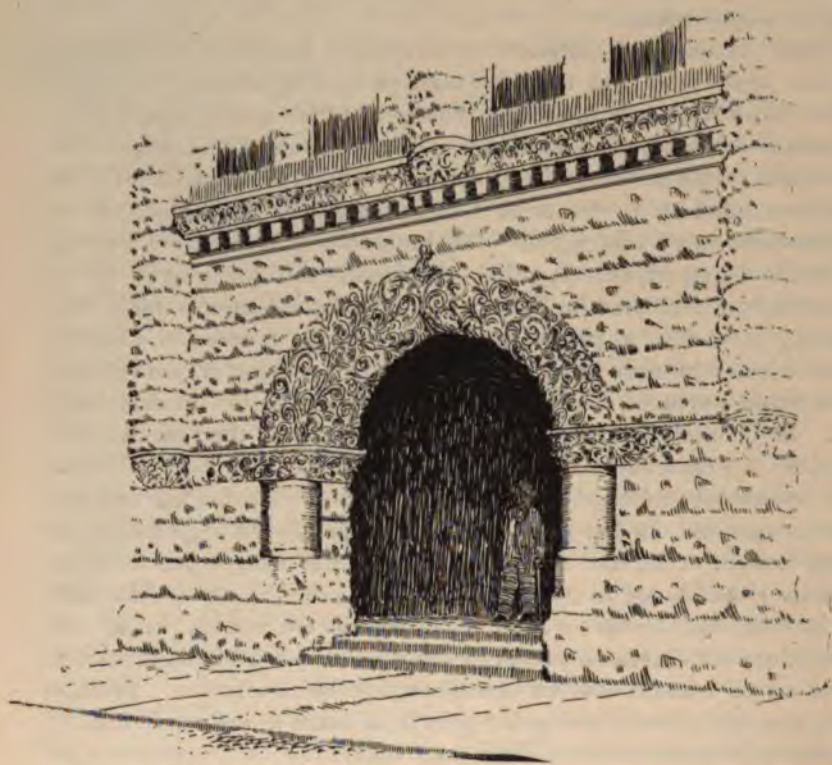
Now, since our country, dating from that period, has practically doubled in population, products and wealth, larger remedies are required. We cannot expand through restriction, but, on the contrary, by liberal removal of obstacles. It is somewhat similar to the situation as to the proposed resumption of specie payment ten or more years after. After the close of the war Horace Greeley was scouted for declaring that "the way to resume was to resume." The way to restore our supremacy on the seas is to restore it. One bold business stroke by the congress of the United States will accomplish it. The vast volume of government bonds issued in defiance of justice and right, payable in gold, in redemption of greenbacks and other government indebtedness, incurred during our civil war for supplies or services patriotically furnished at double or treble prices, has happily been so reduced that capital heretofore *rusting* securely in these bonds, must seek other investment, and, given the opportunity, enough of it could be attracted to steamship lines to reach the desired result. The \$200,000,000 annual earnings, rapidly increasing, now made by foreign ships out of the trade of this country, will be readily competed for by our own capital if encouragement instead of restriction is applied. I do not consider it necessary for government to prescribe as conditions to free ships whether built at home or purchased or built abroad, that these shall be of specified strength, size or speed, because all this may be left to the owners who will know that in such essential elements of competition we must lead and not

follow. Speed can only be with ample strength, and speed will in any great naval war beat heavy armor plate, especially with American officers and crews. And it is fully as essential to restore our sailors as to restore our ships, and with the rise of our mercantile navy must be coupled ample provision to prepare men to run it, for though flying the American flag, a ship manned by Lascars, Malays or Chinese can scarcely be classed as American in an emergency.

I can think of no more patriotic or profitable purpose to which our congress can apply time and thought than to accomplish the end under discussion. That free trade in ships and ship material may appear to temporarily reduce revenue, cuts no figure. What if it does, and what if reductions of war tariffs in other directions leave annual deficiencies for a few years until we build up to the more liberal conditions involving vast increase of business in all directions? The bonds for debt incurred through the war besides being payable in gold, a commodity thus made twice as valuable as the debt was created in, have been paid off much more rapidly than there was any necessity for, practically putting on one generation a burden that should more equitably have been distributed on three or four generations, such rapid payment, however, forming the excuse for maintaining a war tariff. So if relief through which our supremacy on the seas can only be reached by a deficiency, what stands in the way of a re-issue of bonds heretofore too rapidly called in? The United States is a great big business corporation, organized for the good of the whole people (though seemingly run for the benefit of the few at the expense of the many), and with unlimited credit if we choose to go in debt, or what will amount to the same thing, to stop paying off debt not yet due, because we can lay broad and deep foundations for increased prosperity to all, it is perfectly legitimate to do so. But, again I assert that we cannot expand by restriction. Prohibitive duties may have forced hot-house growth of some of our small infants, but the world's commerce on the high seas cannot be built up on a sugar and milk diet. It will take doses for a grown person such as this subscriber is only one of the many thousands to prescribe.

Alex. H. Smith.

SOME ELABORATE STONE ENTRANCES.



ON this and the following page we present, through the courtesy of the publishers of *The Southern Architect*, designs for entrances to public buildings submitted in competition by Southern architects. In response to frequent demands for illustrations of this sort, *STONE* will, from time to time, present views of modern buildings in the construction of which stone enters.

"*STONE*, in our opinion, is one of the most interesting of magazines, and gives more real information respecting our business than any other publication known to us. May you continue to prosper."—*Cuthbert & Sargent, Topeka, Kan.*



"I have been more than pleased with your journal for the past year. I consider it one of the most valuable of its kind published, more especially for stone dealers."—*John Troutt, Chattanooga, Tenn.*

"The copy of *STONE* you sent me is filled with valuable information, and I am so pleased with it that I inclose amount for one year's subscription."—*J. D. Johnston, Architect, Newport, R. I.*

"We are highly pleased with the work, and think it ought to be in the hands of everyone interested in stone work. Wish you every success."—*Carr & Ball, Newark, N. J.*

"We prefer this monthly to anything else we take for general information of the trade."—*Bay City Stone Co., Bay City, Mich.*

"We think *STONE* is a useful and instructive magazine."—*Kyune Graystone Co., Salt Lake City, Utah.*

IN RETROSPECT.

[Read at the Ohio Marble and Granite Dealers' Convention, by I. H. Kelley, and published by request.]

ANOTHER half year of time has been recorded since last we gathered in convention to look over the field, and now we come together again and ask ourselves the great political question, "Where are we at?" Other questions come up bearing upon this suggestive interrogatory, appealing to the conscience of every member of this Association. The first one, "Have we each done our separate duty?" can and must be answered by you, as well as by myself; but whether all answers will be alike or not, remains to be developed.

In my experience, the question, "What does it amount to?" (meaning our associated effort) has been most frequently asked. The apparent answer seems to be only this: "Nothing." But this is not the true answer—and why not true?

Look over the field from one end of the Union to the other, and note the growth of associated effort in its grandest results. First of all, a strike, the magnitude of which is only equaled by like events in the great railroad or iron interests of the nation—and these not peaceable as the granite strike was—has been carried through for months and at last settled with scarcely a case of violence, or even rough treatment known. The school of the association has taught each side to respect the opinions of others, to wait with patience the edicts of the authorized majority and to submit to the popular will, even at the sacrifice of individual opinion.

Beside this many, many times has the jealousy of former years been relegated to the background of absolute forgetfulness, and those who were competitors, earnest and determined, have, when the battle was over, met and talked the matter over in a neighborly way, profiting by each other's experiences in defeat or victory. Could such a state of affairs have been formed prior to the days of our association? No, indeed.

And yet there is much to be done to make our association anything near what it should be. I am well aware that there are many of our own members who look upon our efforts, with all facts before them, as futile and productive of no decisive results for future financial good. It is this prefixed view that deters many a one from lending us the helping hand he might easily and profitably extend. He places the block of prejudiced opinion before the wheels of progress; his faith is not strong enough to remove the mountain before his door, because he knew it would not be removed; he is willing to be a stumbling block, rather than make clear a pathway which should ultimately lead to financial success.

This association in its wisdom, to the end that the strength and usefulness both in members and effective results might be increased, saw proper to appoint a committee to devise ways and means whereby this great end might be accomplished. That committee, after the fullest conference and due deliberation, reported that the best means to increase the membership and to promote the influence, power and usefulness of this association was to form district associations, to be a part of, subject to, and governed by the state association. This report was laid before the state association in convention assembled one year ago, and was unanimously adopted by that body, and your secretary was authorized to assess the membership in the sum of ten dollars per capita to defray

the expenses of carrying out the plan of your committee—a sum so insignificant for the promised good that it was supposed that not an objection would be found in the ranks of our honorable brotherhood. But

"The best laid plans of mice and men
Gang aft a'glee,"

and obstacles appeared in the refusal of many of our members to submit to the expressed will of the majority who adopted the report of the committee. It is true that many a willing one contributed promptly of his means to further this laudible measure, but there has not been a sufficient number to give assurance of complete success if the work is attempted. It seems to some very strange that we should be met with this refusal since some associations, whose financial interests are no greater than ours, assess their members in the sum of one hundred and fifty dollars, and it is cheerfully paid.

The reasons for refusal to pay assessments are almost amusing, but are generally based solely on private opinion as to the efficacy of the undertaking, reminding one of the parties engaged in a scriptural argument, and when one quoted what Paul said remarked that "there is just where Paul and I differ."

These parties are not willing to accept the tried judgments of a duly appointed committee, but view these assessments as an unjust and unwise burden placed upon them without their will or consent.

Who is to blame for this condition of affairs? Surely not those who were faithful and attended the meetings of our association. Had all our members attended our several meetings, giving aid by counsel and effort in the furtherance of the ends sought to be attained; had urged upon their neighbors and competitors to join so good a purpose; had been present to vote for such measures as their wisdom dictated was for the greatest good, and whose voices should have been raised in behalf of associated effort, then these assessments would not have had to be made.

But what have the dilatory ones done, and what are they apparently striving to do? While those who have been foremost in the endeavor to make our association strong and helpful, to aid not only themselves but the whole trade in general, sacrificing time and money, working with heart, hand and means—and that right cheerfully—the drones of our hive are throwing every obstacle in the way, prophesying failure to make the faithful faint-hearted, and endeavoring to bring wreck and general disaster upon that which can be of only positive good if carried as it may be with full effort to absolute success.

But a brighter day is dawning in the East, the source from whence cometh the light. Already the tocsin of war is sounded against those who are unwilling to do their duty, who are perverse and determined to prevent the accomplishment of grand and noble results, and soon will come back the echo from every quarter of the great manufacturing centers, "We are with you—press forward," and our efforts, backed by such power and strength as is now offered, cannot fail. Many who have been so often urged to do their whole duty will read the "hand-writing on the wall"—"Thou art weighed in the balance and found wanting"—when it is too late to escape the direful consequences of their dilatory or obstinate actions.

Through the channel of the national association, whose efforts to connect the whole trade interests of the country are now so persistently put forth, will be found a means to discover where failure to perform actual duty has its bearing, or where absolute wrong is intended, and how these errors may be corrected, and that right speedily.

It has been a long time that the machinery of the associated legislation has been striving to bring this point to effectiveness, but it is believed that it has now been ac-

complished, and when the axe of decapitation shall fall upon the neck of any luckless wight who so far forgets his manhood and his duty as to bring himself under the penalty of the expulsoy laws of his state or local association, the strong right arm of the East will hold the verdict true and the sentence just.

I desire to hold out no will-'o-the-wisp promises nor prophecies, but I feel assured that it is within the reach of possibility and, as I view it, within the realm of probability that a great awakening is soon to be experienced all along the line of associated effort. The dull, apathetic indifference that has characterized all branches of trade, especially in our own vocation, must give place to more active, energetic measures, and we must begin to reap and gather in our harvests if we desire to gain anything whereby we may live through the winters of our later days.

Years of fruitless experience have demonstrated the fact that holding our hands on the throats of our neighbors will not enhance our own respiration, nor pay us for the time spent in our foolish efforts to strangle him. Better that we rise as teachers and show those who are in darkness that there is a "more excellent way" in which we can help and improve our own conditions by aiding and helping others, assisting them to lay aside petty jealousies, which only hinder and cannot help, and putting on the new garb of brotherhood and helpfulness, laying aside that of selfishness and suspicion.

And now, my brethren, you who have traveled this long and weary road together, will you not again resolve to put anew your shoulder to the wheel and push the burden on to an assured success, or will you turn back and look upon the scenes behind until, like Lot's wife and the drones of our association, you turn to a pillar of salt which, like that spoken of, will be "a salt that has lost its savor, and wherewithal shall it be salted?" And if you turn,

WHICH ROAD WOULD YOU TAKE?

If you could go back to the forks of the road,
Back the long miles you have carried your load,
Back to the place where you had to decide
By this way or that through your life to abide,
Back to the sorrow, back to the care,
Back to the place where the future was fair;
If you were there now, a decision to make,
O, pilgrim of sorrow, which road would you take?

Then, after you'd traveled the other long track,
Suppose that again to the forks you went back;
After you found that its promises fair
Were but a delusion that led to a snare,
That the road you first traveled with sighs and unrest,
Tho' dreary and rough, was most graciously blest
With balm for each bruise and a charm for each ache,
O, pilgrim of sorrow, what road would you take?

—George McDonald.

THE CONVENTIONS.

NATIONAL ASSOCIATION OF MARBLE AND GRANITE DEALERS.

CLEVELAND, O., January 11, 1893.

PURSUANT to the call of the president of the National Association of the Marble and Granite Dealers and Manufacturers of the United States and Canada, assembled in convention at the American Hotel on the above date, in accordance with the stipulations of the present constitution.

The president, James Harsha, called the meeting to order promptly at 10 o'clock; I. H. Kelley filling his position as secretary. The following persons were present: James Harsha, president; I. H. Kelley, secretary; Philo Truesdell, delegate from Michigan association; Ira P. Rowley, representing STONE, and Schuyler Powell, delegate from Indiana association; H. M. J. Jones, delegate from Protective association, Boston, Mass.; C. G. Leavenworth, from Ohio association.

The president stated the object of the meeting to be the ratification of the legislation enacted at the meeting of delegates, held in Quincy, Mass., April 20, 1892, comprising the consideration and adoption of the constitution and by-laws as there promulgated and adopted by that body, and also the transaction of any business which may lawfully come before this meeting for consideration.

The president stated the object of the meeting at Quincy was to call together the manufacturing associations of the East, and the dealers of all parts of the country and determine whether it was necessary to continue the existence of the National association or not. To this end a committee was appointed and a constitution and by-laws were adopted by that body which would be presented to the National association for adoption or rejection by the National association now in convention assembled.

At this point a motion was made that H. M. J. Jones, delegate representing the Wholesale Protective Association, of Boston, Mass., and Ira P. Rowley, of STONE, and Schuyler Powell, of Indiana association, be accorded the privilege of members. Motion prevailed.

The president requested the secretary to read the minutes of the meeting held in this city, July 29, 1891, and also the minutes of the delegate assembly meeting held in Quincy, April 20, 1892, which was done. Minutes ap-

proved. Mr. Philo Truesdell moved that the constitution and by-laws formulated at Quincy be adopted as the law for the government of the National association and that the former constitution and by-laws be hereby repealed. Motion prevailed.

A motion was made that section ten, of the constitution, be amended by adding thereto the words: "who shall govern themselves accordingly." Motion prevailed.

Mr. Philo Truesdell moved that the secretary be instructed to correspond with all marble and granite dealers' associations in the United States requesting them to join the National association and ask their hearty coöperation therewith, and that a copy of the constitution and by-laws accompany each communication, together with such information as shall be for the general interest of all parties concerned. Motion prevailed.

The secretary was instructed to have a sufficient number of copies of the constitution and by-laws printed so that this order might be fully carried out, and for the present use of the association.

The secretary was further instructed to make demand upon several associations holding membership in the National association for their per capita tax in accordance with section six of the constitution.

The following resolution was presented, and on motion was unanimously adopted:

Resolved, That it is the judgment of the National association that the expenses of the president of the National association incurred in attendance upon the meeting of the delegate assembly held in Quincy, Mass., April 20, 1892, together with the expense of type-writing the constitution and by-laws, and the postage thereto attached, should be equally borne by the several associations there represented. Provided, however, that the Granite Manufacturers' and Dealers' Association, of Quincy, Mass., in view of the fact that they were at great expense in entertaining delegates at that time, be exempted.

The secretary was instructed to send a copy of this resolution, together with a statement of the equal share of each association, to all associations represented at Quincy, and request a remittance of the amount.

Mr. Truesdell presented the following resolution:

Resolved, That the president of the National association appoint a committee to confer with like committees from local or state associations of the marble and granite dealers of the United States with a view to promoting a congress of marble and granite dealers of North America, to be convened in Chicago, Ill., during the World's Columbian exposition.

Resolved, That the National association in convention assembled, heartily favors such congress.

Motion to adopt the resolutions prevailed and the president appointed I. H. Kelley to act as such committee. The following bills were on motion allowed and ordered paid: J. Harsha, attendance January 11, 1893, \$15.00; printing circulars for call of meeting, \$4.00; postage, \$1.00; total, \$20.00.

There being no further business appearing for the consideration of the meeting, a motion to adjourn was declared carried.

I. H. KELLEY, Secretary.

THE OHIO MARBLE AND GRANITE DEALERS' ASSOCIATION.

COLUMBUS, O., January 11, 1893.

THE semi-annual meeting of the Marble and Granite Dealers' Association of Ohio, was called to order on the above date, at 10:30 o'clock, a. m. President Chas. W. Briggs in the chair, and I. H. Kelley filling his position as secretary. There being but a limited number of members present, J. K. Stewart moved that the meeting adjourn until 2:30 p. m., which motion prevailed.

AFTERNOON SESSION.

2:30 p. m.—The president assumed the gavel upon time and directed the secretary to call the roll, which was done and was responded to by the following: Chas. W. Briggs, Troy, O., president; I. H. Kelley, Springfield, O., secretary; J. P. Kendall, Marion, O.; Dorr White, Kenton, O.; Chas. Wege, H. A. Mason, Columbus, O.; C. G. Leavenworth, representing the Vermont Marble Company, Cleveland, O.; Harry S. Wright, representing Cook & Watkins, Boston; J. K. Stewart, representing Blue Ridge Marble Co., Cincinnati; Alex. Frazer, Mansfield, O.; H. M. Jones, representing Jones Brothers, Boston; F. S. Cary, Zanesville, O.; Chas. W. Pool, representing Davidson & Sons Co., Chicago; John Hoskinson, of Vermont Marble Company, Cleveland, making a representation of six retail and seven wholesale dealers. There were also present, as visitors, Mr. Flatz, of Piqua, O.; Mr. John Reardon, of E. Wolf & Co., Mansfield, and J. F. Townsend, of Columbus.

The minutes of the last meeting, held at Toledo, O., were read and approved.

There being no response to the call for applications for membership, the president addressed the meeting in well-chosen remarks, pointing out the difficulties and obstacles to advancement, and suggesting remedies. His address caused stirring applause. The secretary's report was next presented, showing the present financial as well as the numeral status of the association. The present membership is, retail dealers, fifty-six; wholesale dealers, twenty-seven; honorary members, five, making a total of eighty-eight. The secretary called attention to the amount of salary voted him by the association, especially the sum of fifty dollars increase at last meeting, and asked the association to reconsider that motion, that the salary might remain as heretofore. A motion to reconsider was carried and original motion again put on its passage and declared lost. The matter of delinquents as presented in the secretary's report was called up and caused a great amount of discussion.

Mr. C. W. Pool offered the following:

Resolved, That the assessment of ten dollars collected for the purpose of redistricting the state be held in the treasury for a special fund, and to use for no other purpose, and

R.—Stone.

in the event of the amount not being paid by those now delinquent by July 1, 1893, that the several amounts be returned to those who paid them in.

Motion prevailed.

After this motion passed a discussion relative to the case was freely participated in and it was decided to reconsider, which was carried. On the original motion being put on its passage it was voted down.

Mr. J. K. Stewart then moved that a committee of three be appointed to revise the resolution adopted February 10, 1892, and to report on the best plan in their judgment to dispose of the whole matter. Motion prevailed, and the chair appointed C. G. Leavenworth, C. L. Batchelder and H. A. Mason as such committee.

A motion to adjourn until 7:30 p. m., for an evening session was carried.

EVENING SESSION.

7:30 p. m.—The meeting was called to order with all present as reported.

The committee appointed to revise the resolution of February 10, 1892, presented the following report:

Your committee appointed to revise the resolution adopted February 10, 1892, for re-districting the state, would recommend that the resolution be amended and that the following be inserted:

Resolved, That the secretary be empowered to employ a competent organizer to thoroughly canvass the state with the sole view of securing members to this association, and that the funds raised under the original resolution and now in his hands be used for this purpose.

Resolved, That in view of the fact that the present membership is limited, and that this work is for the benefit of all dealers throughout the state, we recommend that these assessments of ten dollars levied for this purpose be considered as a loan, to be refunded whenever the financial status of the association shall warrant.

C. G. LEAVENWORTH,
CHAS. L. BATCHELDER,
H. A. MASON,
Committee.

On motion the report was unanimously adopted.

On motion the secretary was instructed to send a printed copy to each delinquent and request payment of the amount of his delinquency, with the statement that if payment or satisfactory adjustment is not made by the next regular meeting in July, that charges will be filed against them in due form, and they be cited to appear for trial. Motion prevailed.

Mr. Batchelder offered the following resolution:

Resolved, That the secretary be directed to employ some suitable person to make a canvass of the state, or to make such canvass himself, and that it be done as soon as possible, and that the association pay for such services a salary of three dollars per day and all necessary expenses incidental thereto.

Motion prevailed to adopt this resolution.

Mr. C. G. Leavenworth moved that on and after July 1, 1893, the membership fees be increased to five dollars. Carried.

On motion the revised constitution and by-laws adopted by the national association was assented to. The report of the delegate to the national

association was adopted and ordered to be placed on file. Mr. Leavenworth moved that the per capita tax due the national association be ordered paid. Motion prevailed and the secretary was instructed to remit amount due to national association.

The committee appointed to investigate the charges against W. H. Perry reported that as they could not compel witnesses to appear they could not try the case, and returned papers without action or recommendation. J. B. Eckhardt of the committee, also presented a personal report, stating that all evidence as far as obtained showed that Mr. Perry had violated his agreement with the New England Association, and suggested that all members of this association refrain from buying from Mr. Perry as much as possible.

On motion of H. M. Jones the report was received and the committee discharged.

The report of the committee in the case of the Vermont Granite Company of Lima, O., against Chas. Clements was called for, but no one being present to report it was passed.

A paper entitled "In Retrospect," was read by I. H. Kelley. (See page 224.)

Mr. C. W. Pool moved that the paper be sent to *STONE* and *Monumental News* with request to publish the same.

Motion prevailed.

The president called Mr. C. L. Batchelder to the chair and presented written charges against Prince & Ritter, of Troy, O., with doing business contrary to good business principles and in violation of the laws of the Marble and Granite Dealers' Association of Ohio. The matter was, on motion, referred to W. A. Harsha, W. W. Butler and I. H. Kelley as a committee of investigation. The secretary was appointed to further the call for a congress of marble and granite dealers to be held at Chicago, Ill., during the Columbian exposition. Mr. H. J. M. Jones moved that the next semi-annual meeting be held in Springfield, O., at the Arcade Hotel, on the third Wednesday, July 19, 1893. Motion prevailed. It was moved that the secretary prepare a program embracing the preparation of essays on topics of interest to the trade, or such matters as may be for its advancement.

Motion carried.

The resignation of the True Blue Marble Company as members of this association was presented and accepted, and a card of honorable withdrawal granted.

On motion of C. G. Leavenworth a committee was appointed to draft suitable resolutions of sympathy for Bro. H. W. Woodard, whose loss by death of his wife has been reported to this association. I. H. Kelley was appointed as this committee, and instructed to engross the report upon the minutes of this association, and send a copy of the same to Bro. Woodard and to the press for publication.

RESOLUTIONS OF SYMPATHY.

Resolved, That the Marble and Granite Dealers' Association of Ohio in convention assembled, having learned of the death of the beloved wife of Bro. Homer M. Woodard, would hereby tender to him our heartfelt sympathy in his irreparable loss; that we recognize our utter helplessness to give comfort in such a trial, but we would point him to that Great First Cause for fullest peace, of whom it is written, that "not a sparrow falls to the ground without His notice," and "He doeth all things well." We know that words are inadequate "to still the rising sigh" in such an hour as this, yet we trust that this simple recognition of his great loss will assure him of our kindest remembrance, and tend to smooth the pathway through which he must pass in submission to this ordeal.

By order of the association,

I. H. KELLEY, *Committee*.

There being no further business to come before the association, on motion it was declared adjourned

I. H. KELLEY, Secretary.

THE NEBRASKA MARBLE AND GRANITE DEALERS' ASSOCIATION.

THE Nebraska Marble and Granite Dealers' Association held its fifth annual meeting at Omaha, January 18, 19 and 20, 1893, with the largest attendance ever had at any of its meetings. Nearly all dealers doing business in Nebraska, either wholesale or retail, were present. Visitors from Council Bluffs, Red Oak and Glenwood, Iowa, and Washington, Kansas, were with us to help a good cause. An "experience" meeting during the second day's session was a new and valuable feature. A good many sore spots between members were healed by satisfactory explanation of numerous apparent "worked" transactions.

The association voted to join the National association, and also to assist in arranging for a meeting of marble and granite interests in Chicago some time during the world's fair. Only two formal complaints were made, and upon investigation they were dropped, the parties evidently acting under a misapprehension. D. H. Dickinson generously passed around the opera tickets at the close of the first day's meeting and received as a reward, the thanks of the members. A. Neitzel, Falls City, was elected president and J. N. Kildow, York, secretary and treasurer.

J. N. KILDOW, Secretary.

THE OHIO VALLEY ASSOCIATION.

THE Ohio Valley Cut-Stone Contractors' and Quarrymen's Association convened in annual session at the Denison Hotel, Indianapolis, Tuesday, January 24. President Peter called the meeting to order and Henry C. Adams, of Indianapolis, introduced Mayor Sullivan, who, in welcoming the members of the association to the capital of Hoosierdom, said; "I can assure you, gentlemen, that I am very glad of the opportunity of

being present with you this afternoon. In order that you may understand that the city of Indianapolis recognizes the importance of the industries represented by you, I need only to say that she is a progressive city. Her building operations during the past year compare favorably with those of cities similar in size. She welcomes you because you contribute in no small degree toward making her what she should be. The stone from your quarries, embellished by the handiwork of the cut-stone men, adds dignity and beauty to her public buildings. For this she feels indebted to you. In no other city of like size is the spirit of progress dominant in the people to the extent it is here, and to those who carry out the ideas of the people of Indianapolis, the city feels indebted. We know the object of your gathering here and are glad you selected our splendid city for your meeting place. We trust that the convention will be a success; that you will achieve all that you set out to do. By coming together you secure an interchange of thought and opinion and return home benefitted by personal contact with others in the business. You help to build up the cities of the country—Indiana and Ohio stone goes everywhere. We take pride in the fact that the beautiful buildings of the city are fashioned from stone produced by our own state and our sister state, Ohio. I am here to welcome you on behalf of our citizens, which I do most cordially. I have been invited by your local members to participate in your banquet but other engagements prevent my attending. I thank you, however, and hope that nothing will occur to mar your pleasure."

A rising vote of thanks was tendered the mayor for his cordial greeting, after which the roll was called and responded to by the following members: Blatz & Krebs, Louisville, Ky.; James P. Byrne, Cincinnati; Driver Bros., Hamilton, O.; James Diebold & Son, Louisville, Ky.; Isaac Graveson, Cincinnati, O.; Samuel Goddard & Co., Indianapolis; G. Ittenbach & Co., Indianapolis; John Oman, Nashville, Tenn.; Peter & Burghard, Louisville, Ky.; J. A. Schmid & Co., Indianapolis; Whitsitt & Adams, Indianapolis; F. R. Caden & Co., Evansville, Ind.; Big Creek Stone Co., Stinesville, Ind.; Bedford Stone Co., Bedford, Ind.; Cleveland Stone Co., Cleveland, O.; Chicago and Bedford Stone Co., Bedford, Ind.; Furst, New & Co., Chicago; Greensburg Limestone Co., Greensburg, Ind.; Grafton Stone Co., Grafton, O.; Malone Stone Co., Cleveland, O.; Maxwell, Rolf & Co., Cleveland, O.; North Bedford Stone Co., Stinesville, Ind.; Oölite Stone Co., Spencer, Ind.; Perry, Matthews & Buskirk, Bedford, Ind.; Portage Redstone Co., Chicago; W. R. Smith & Sons, Otway, O.; Perry Bros., Ellettsville, Ind.

President Peter congratulated the members upon the generous attendance, briefly reviewed the history of the organization and commented on the benefits accruing to members who should realize as he did, what organization meant to those in the trade. He cited one case where his firm were

benefited to the extent of \$4,000 through their connection with the association. He urged upon those present the importance of acquainting their neighbors with the advantages of membership; saying that greater good would come to the organization by individual effort on the part of its members, than in any other way.

The minutes were read and adopted with one correction.

Applications for membership were made and accepted, as follows: David Reed, Bedford, Ind.; Bedford Building Stone Co., Bedford, Ind.; Whitsett & Adams, Indianapolis.

On motion of Mr. Kessing a resolution prevailed that the members proceed in a body to the capitol on the following morning and pay their respects to Governor Matthews, who had expressed a desire to see them. A recess was then taken for payment of dues, fees and fines, after which the following interesting paper was read by Major H. F. Perry, of Bloomington, Ind.:

STONE AND ITS USES.

It is not within the province of this paper to discuss the age of the planet which we inhabit. For our purpose it matters not whether the world was made in six days of twenty-four hours each, or whether millions of years have elapsed since it "was void and without form." We can leave the discussion of this matter to the philosophers, the geologists and the theologians. Neither can we concern ourselves with the theory of evolution, further than to insist that when the earth became habitable for man, the rocks were here ready for his use. It is evident, too, that it is a long step from the time when our savage ancestors tipped their spears and arrows with stone, chopped their wood with stone axes, and pounded their grain in stone mortars with stone pestles, to the present day.

It would also appear, that notwithstanding the thousands of purposes for which mankind now find stone to be useful, and almost indispensable, to prehistoric man it was a priceless boon, and his existence could hardly have been maintained without it. Moreover, it is absolutely certain that the earliest historians of the human race, preserved to us the history and traditions of their time, by engraving them upon monuments and tablets of stone. It is probable that rude dwelling places and forts were constructed of stone long before the ingenuity of man had devised any written language. Caves and dwellings of considerable antiquity still exist in the chalky cliffs of many countries where the climate is so mild that the restless forces of nature have not destroyed them. In this connection it is worth while to notice that learned antiquarians, who have made a life study of the subject, divide the existence of man into three periods, to-wit: The age of stone, the age of bronze and the age of iron. It is a significant fact, as showing its great importance, that first in the list comes stone. The fact that stone is the mother of many of our precious metals—that in quartz we find gold and silver; in limestone, lead; in malachite, copper; and in sandstone, iron and other minerals—gives it a still more important place in the scale of usefulness to mankind.

As workers in stone, we who compose this association, while congratulating ourselves that we are connected with such an ancient and honorable industry, must first consider the distribution of the different varieties of stone that is useful for building, for ornamentation, and for statuary, incidentally touching upon the means employed in producing, working and handling the same in our own day and generation. The distribution suitable for building purposes, over the surface of the earth, is more general than might at first be supposed; but, as we are interested chiefly in the product of the United States, it is hardly worth our while to go beyond the limits of this country in our examination of this branch of the subject.

Scattered all over the New England states we find granite, slate and marble, with occasional beds of sandstone and limestone. Through the mountains of New York, Pennsylvania, West Virginia, Tennessee, North Carolina and Georgia the formations are much the same. Magnesian limestone or dolomite is found in great abundance in

nearly all the territory between the Alleghany and the Rocky mountains. In northern and eastern Ohio are found vast deposits of buff and blue sandstone. In the southern part of the same state, in Kentucky and in Indiana are the most massive beds of freestone or knobstone of which I have any knowledge. In many places these beds are more than 600 feet in thickness. Beginning in the southern central part of Indiana and extending as far south as the state of Alabama, is a bed of oolitic limestone of light gray and blue color, varying in thickness from ten feet to 250 feet, and showing no outcrop of a greater width than twenty miles, at any one point, in the whole length of the belt or strip. It is needless to say that there are occasional breaks in this belt where no outcrop is visible for several miles. A harder variety of this stone is found in southern Arkansas, extending thence northward into Missouri. Above the coal measures of Indiana and Illinois are found heavy layers of coarse sandstone generally of a light brownish color sometimes deepening into red. In both these states, as before stated, limestone of various kinds is very abundant, although there are counties within their borders, where one may travel for miles without finding a stone of any kind as large as a walnut. In Michigan, in Wisconsin, and in Iowa there are, in addition to the limestone, very extensive outcroppings of nearly every variety of sandstone known to the building trade. The state of Missouri has, in addition to her limestone and sandstones, extensive ledges of red and gray granite. Beds of limestone extend through Kansas into the Indian Territory and thence far down into Texas.

I find that the limits of this paper will not admit of my going farther into details. I have noted the distribution throughout nearly all the territory in which this association is interested. To attempt to classify all these varieties of stone, and place each class in its proper geological period, would be out of place here; but, before I leave this branch of the subject, I must not forget to state that many localities in this district, otherwise barren of stone, have been very liberally supplied with boulders by the great glaciers, which, in remote ages, crept slowly over the surface of the country to do battle with and be destroyed by the fierce rays of the southern sun.

I have hinted at the domestic uses of stone in very ancient times and its more recent utilization in statuary, in monuments, and in buildings; but a far greater quantity is used for various other purposes, such as the construction of breakwaters, bridges, fortifications, foundations, culverts, sewers, drains, docks, riprap, curbing, roadways, walks, and fences, and in the manufacture of lime, cement, iron, steel, glass, etc. All our lithograph letter-heads are printed on stone. If any of you doubt that stone has ever been used in a military way, I call your attention to the account of David killing Goliath.

It is hard to determine what has been the most potent factor in the development of the stone industry in our country. Much of it is due to the enterprise of our people. Transportation was required. Our people made canals, built railroads and covered the waters of navigable streams and lakes with the white sails of ships and the black smoke of steamboats. The geologist searched the dark recesses of the earth for the best material, architects made the plans, quarrymen wrenched the mighty masses of stone asunder and reduced them to the proper size, the cunning hand of the workman wrought with the mallet and chisel, and, in all the cities of our land, there sprang up buildings, which, in many instances, rival in magnificence the palaces which the magician built for Aladdin. Let us hope that this development, marvelous as it may seem to many of us, is yet in its infancy. In this direction this association has large responsibilities. It must keep fully abreast of the times. Not only that, it must see to it that the building of to-day is of as durable material and of better workmanship than the building of yesterday. You are to be congratulated that in all your efforts for the improvement of all the structures which you may assist in erecting, you will have the hearty coöperation of the earnest and intelligent architects of your section. To them you owe much of your prosperity. True, they have made mistakes, both in design and in the selection of material, but such mistakes are only steps in the pathway of knowledge, and you may be reasonably certain that any innovations or changes, which their ingenuity or inventiveness may bring about, in the construction of buildings, will add to rather than detract from the share which you will have in the work.

Practical men are apt to underrate the services of the geologist in pointing out the localities where building stone and other minerals can be found and profitably worked. Their judgment in regard to what constitutes a good building material is sometimes at fault, and many costly blunders can be laid at their doors; but scientific research has accomplished much, and I think it may be safely asserted that Dr. John Collett, formerly state geologist of Indiana, has had a larger share in the development of the stone industry of this state than any other man living or dead. The result of his work is not

limited by state lines. I am glad of the opportunity of paying this small tribute to his genius, his zeal and his unselfish labor in this behalf.

The most essential qualities of good building stone are durability, strength, color and susceptibility to ornamentation. The scientific methods now employed to test the durable qualities of stone are so unreliable that we may consider them worthless. A careful examination of the outcroppings of ledges, which bear the marks of old age and exposure to all kinds of weather, will generally enable you to come to a safe conclusion. I do not say that this method is absolutely reliable, for the product of the quarry will be used where climatic and atmospheric influences are far different from those which are brought to bear upon it where the quarry is located. In some of the costliest buildings in England, the stone, though apparently selected with great care, soon began to show signs of decay. Then began a search after something that would arrest decay. After experimenting with various applications it was found that those containing oily, resinous matters readily absorbed by the stone were the best. The great obelisk, brought from Egypt to New York a few years ago, when found to be yielding to the influences of a new climate, was treated in this way, with what result I am unable to say. The old rule, "an ounce of prevention is worth a pound of cure," is a good rule for you; and, when urged to use a material for building which you have reason to believe is, for any reason unsuitable—don't.

I had prepared a table giving the crushing strength of different varieties of stone, but since I find there is no variety in use in this district that has not a far greater crushing strength than brick, I will only say that it runs from 6,000 pounds per cubic inch in the softer sandstones, to 19,000 pounds per cubic inch in the hardest granite.

Color is a matter of taste, but, unfortunately, many a fastidious man who will have nothing but the very shade that is most pleasing to his eye, has found that in stone, as well as in calico, all colors are not fast. You will often be consulted in regard to the color as well as the strength and durability of the stone designed for use in some proposed structure. Let your answer be candid and frank, as far as your knowledge extends, and you will never have occasion to say: "That building is a constant eyesore to me." For fine ornamentation you have an abundance of material on which your chisel can cut smooth surfaces and perfect lines, but where elaborate carving is required, it is the duty of the quarryman to see that the stone selected for that purpose is the best his quarry can produce. It should be of even texture and free from every imperfection.

For fine statuary the purest white marble has been in use since mankind first began to fashion stone into the semblance of the human form, and at this day, excavations on the sites of ancient cities are constantly bringing to light samples of this class of work, which, for originality and beauty of design, as well as good workmanship, can hardly be equalled in the best studios of modern time. To the ancients we are also indebted for the five principal orders of architecture, and all your work is along the lines which they have laid down for you. Even the names by which they designated many parts of the work have followed them down through centuries.

While the ancients displayed such excellence in design and execution of stone work, their facilities for quarrying and handling stone were so inferior to those of the present day that we look upon the work they accomplished with wonder and astonishment. They had no gunpowder or other explosive; they had not the slightest conception of a harness for steam or electricity, or of making these elements submissive to the will of man. Wire ropes and channeling machines were unknown to them, and still they were able to quarry, transport and set in buildings and lofty temples blocks of stone so massive, that none of us would be willing to take the contract for moving them to-day without first reducing their size. Of them it may well be said, "there were giants in those days." Drawings have been preserved which show large bodies of men tugging at ropes attached to blocks of stone, either on rollers or inclined planes lubricated with soap. It is thought that sometimes as many as 10,000 men were thus employed in moving a single block of stone. We are told that the wages of these men were paid in corn, wine and oil, otherwise the revenues of a kingdom, ever under high tariff, would hardly have been sufficient to build a temple like that at Jerusalem.

Working under union rules would have made King Solomon scratch his head, as many of you have scratched yours, and when his temple was completed he wouldn't have had enough gold and jewels to elicit the admiration of the Queen of Sheba to any great extent. It is within our generation that the greatest revolution in quarrying and handling stone has been accomplished. The channeling machine, the steam drill and steel wire rope are the chief factors in bringing about this great change. Formerly a free bed or horizontal open seam was considered essential to the successful working of

a quarry; now, the fewer seams, either horizontal or perpendicular, the better, for the simple reason that the quarryman can make all the seams he requires without the least injury to the stone. Formerly a crew of men worked long and laboriously with a hand power to raise a block of stone from the ground to the height of an ordinary flat-car; to-day steam power and wire rope lift the same block to any required height with the same speed and apparent ease with which you would lift a bag of feathers. The result is that stone now is sold at the quarries for little more than half the price of twenty-five years ago, and, with about the same scale of wages to employes, the producer finds that his profits have not been materially lessened. Great improvements have also been made in machinery for cutting, sawing and setting stone in buildings. Freight rates have been somewhat reduced and, as a consequence of all these improvements, the demand for stone has increased enormously. I am sorry that I have not the statistics of the output of the different classes of stone for the year 1892. Of the oölitic variety the Indiana quarries produced 500,000 tons, an amount almost equal to the output of the best years of the same class of stone from the quarries of Portland Isle in England. This is a great advance over any former year, and probably the same is true of the output of other varieties.

In times of bountiful harvests and great public prosperity, the business of the builder and quarryman will flourish, but, whether the times are hard or good, your interests are, to a certain extent mutual, and you should at all times lend to each other the heartiest coöperation. Let all your dealings be characterized by honesty and fairness. It is not likely that all of you will ever deal extensively in such stones as the diamond, the topaz or the garnet, or that you will ever be compelled to deposit such articles with your uncle, at the sign of the three balls; but, if you are prompt in the discharge of all your obligations and faithful in all things, some day your surviving friends may think it worth while to erect over the place where your body reposes a lasting monument of stone.

A discussion was then had on that part of the paper relating to crushing tests participated in by Messrs. Grubb, Smith, Kessing and others. Mr. Ittenbach moved that the paper be published in *STONE*. Carried.

Motion that meeting be adjourned until following morning; carried and withdrawn by consent. Secretary McGee submitted his annual report, as follows:

To the Ohio Valley Cut-Stone Contractors' and Quarrymen's Association:



to take the vote of the absent ones by correspondence. This I did and the following is the result:

VOTE ON AMENDMENTS.

Mr. Miller offered an amendment to Article V of the Constitution to read as follows: The Constitution and By-Laws can be amended at any regular meeting by a two-thirds vote of the members present.

On this the vote by correspondence was: Yes, twenty-one; no, four.

On the amendment to Article I, Sec. I, offered by Mr. Peter. To read as follows:

The regular meeting of this association shall be held annually on the fourth Tuesday of January, etc

On this the vote by correspondence was: Yes, twenty-four; no, two.

On the amendment to Article IV, Sec. I, by B. A. McGee reducing the entrance fee from \$100 to \$25, the vote was: Yes, eighteen; no, eight.

This carried all of the above resolutions in the affirmative and you will find them incorporated in the By-Laws and Constitution.

In October I sent out a statement of account to each member and the following are some of the excuses I received in reply and would respectfully ask that they be acted on at this meeting.

EXCUSES.

Cleveland Stone Company ask to have fine remitted because of receiving no notice of St. Louis meeting. They have paid all other claims against them.

Hoosier Stone Company and Bedford Oolitic Stone Company consolidated in the Bedford Stone Quarries Company on January 1, 1892, claim that but one company should be chargeable with dues and that the Bedford Stone Quarries Company has paid the dues of one of its predecessors and asks to be recognized a member by right of succession and purchase.

The Salem Stone and Lime Company has been succeeded by the Salem-Bedford Stone Company. The latter company say they have reasons for not attending the meetings. They are willing to pay dues but are not willing to pay fines.

F. Quigley states that he wrote the secretary inclosing the amount due the association and giving as a reason for not attending that he had an important lawsuit under the lien law and could not possibly neglect it without great loss. He is willing to pay his dues.

Prentice Brownstone Company are willing to pay back dues but not fines. Their reasons are that they could not afford to send a member to distant meetings because they do not think the association of sufficient benefit to them to warrant the outlay.

F. P. Stewart was very sick at time of meeting; says he sent doctor's certificate but no action was taken on it. He will pay back dues.

Babcock & Smith are willing to pay back dues but not fines; would rather withdraw than pay fines; say they are too far away and members of the firm do not feel able to bear the expense necessary in attending.

Stewart & Co. sent doctor's certificate of sickness which they think should have been accepted by the association.

In November I made draft on all in arrears six months, after having given notice to each one that if remittance was not made I would draw. A number of these drafts were paid, others were returned with the following indorsements by the banks:

Bayfield Brownstone Co., payment unauthorized; Dark Hollow Oolitic Stone Co., no attention; Tan Yard Stone Co., no attention; Bedford Stone Co., no attention; Chicago-Bedford Stone Co., no attention; Babcock & Smith, party refused to pay this draft. (I call attention to their reasons before given in this report.) Owen Oolitic Co., refused worthless; Melcher & Herley, no indorsements on same; C. C. Bode & Son, no indorsements on same; Driver Bros. sent letter with \$40 check which was not received; F. P. Stewart refused payment, and no reason given. (Reason given in my list of reasons.) Detroit and Hocking Valley R. & B. Stone Co., no attention; Buckeye Marble and Freestone Co., say return; Kellinghouse & Knissell, no attention; L. C. Buente, mailed notice, no attention; Kelly Bros., these parties have moved to New Orleans; Robbins Bros., return, out of that; John Kastner & Co., refused; Dewar, Grandison & Co., no attention to notice; M. J. Darmody, no attention to notice; F. Quigley, refused, says he doesn't owe it; Pearce & Morgan, no indorsement; L. H. Webber, no indorsement.

I have been advised of the financial failure of two of our members in Nashville, Tenn., Wm. Maddox and Waters & Searl. Our members in Nashville certainly need our sympathy.

Pursuant to resolution your executive committee visited Nashville in February, 1892, for the purpose of investigating charges against John J. Cain & Co. We found the trade in a very bad condition; the cutters were on a strike, and had been for about a year. Soon after we had begun the investigation of Cain & Co., for violation of our rules a proposition was made to submit the entire labor trouble to arbitration, a full account of which I here present from one of the Nashville papers of February 10, 1892: "The stonecutters' lockout, which began just twelve months ago, was amicably yesterday by arbitration. It was determined at a recent meeting in St. Louis to leave the Nashville troubles between the contractors and journeymen to an arbitration committee of four men, and these should refer the matter to a fifth in the event the four should not reach an agreement. This committee met yesterday in the Duncan Hotel

with a large number of journeymen and contractors present. The committee was composed of J. H. Peter, of Louisville, president of the Ohio Valley Cut-Stone Contractors' and Quarrymen's Association, and M. A. Blatz, the treasurer, on the part of the Nashville contractors, and B. A. McGee, of Bloomington, Ind., the association's secretary, and W. L. Malone, of Chicago, one of the trustees, on the part of the local journeymen. Every one present was allowed to speak his mind, and after a three hours' session an agreement was reached with the rules of the Ohio Valley Association as a basis, except in the matter of allowing the local union to assess fines upon the journeymen who had worked with the contractors during the lockout. Therefore, according to the agreement a fifth man was selected, and John L. Kennedy, chairman of the city's board of public works and affairs, was called in. After hearing the arguments for and against, he decided against the levy of fines, on the ground that concessions had been made on both sides, and to settle a strike it was necessary to let all the past go by.

"The trouble grew out of the action of William Maddox, a contractor, in taking his son into his own yards as an apprentice, where there were already two apprentices, which is the limit by the rules of the national union.

"By yesterday's agreement the number of apprentices allowed each firm will hereafter in Nashville be increased to three. The lockout and consequent strike affected between thirty and forty men who have been fortunate during the year to find work upon government buildings being erected in this section."

After the trouble between the contractors and cutters had been settled the president decided that the same questions being involved in the above decision and the Cain & Co., case, it carries with it the charges against J. J. Cain & Co. The president further stated as his opinion that Jno. J. Cain & Co. had violated the rules of the Ohio Valley Cut-Stone Contractors' and Quarrymen's Association though he was not prepared to say that the violation was intentional.

I here present for your consideration the petition of David Reed (quarry) and the Bedford Building Stone Company; fees accompanying each.

The following is a memorandum of receipts and disbursements for the year:

January 26, 1892.	Balance in hands of treasurer.....	\$1,037.06.
" " "	Received from secretary.....	305.00.
February 11, 1892.	Sundries.....	50.00.
" 29, "	Wm. Clark.....	30.00.
March 15, 1892.	Ohio Stone Company.....	20.00.
" " "	Furst & Co., \$10.00, Perry Bros., \$25.00.....	35.00.
" 19 "	Belknap & Dumisnil Stone Co.....	9 85.
" 21 "	Prentice Brownstone Co.....	10.00.
" " "	Terre Haute Steam Stone Works.....	15 00.
April 4, 1892.	Forest City Stone Co.....	20.00.
" " "	Spider Creek Quarry Co.....	15.00.
" 6 "	Bedford Oolitic Stone Co.....	10.00.
" " "	Buena Vista Freestone Co.....	20.00.
June 14, 1892.	Big Four Stone Co.....	20.00.
" 24 "	Peter Swan.....	10.00.
August 2, 1892.	J. H. Smith & Son.....	15.00.
September 5, 1892.	David Reed.....	25.00.
October 27, 1892.	Perry, Matthews & Buskirk, \$5.00; Peter & Melcher, \$5.00; Portage Red Sandstone Co., \$5.00; Furst & Co., \$5.00; W. R. Smith & Son, \$5.00; Jas. Farrell, \$5.00; Pickel Stone Co., \$5.00. David Reed, \$4.40.....	39.40.
" 29 "	Corydon Stone Co., \$5.00; Jno. Trout, \$5.00; Prentice Stone Co., \$5.00.....	15.00.
November 2, 1892.	Malone Stone Co., \$5.00, Blatz & Krebs, \$5.00; Peter & Burahard, \$5.00; Belknap & Dumisnil, \$5.00; G. Ittenbach & Co., \$5.00.....	25.00.
" 5 "	B. S. Quarry Co.....	5.00.
" 7 "	Cleveland Stone Co.....	15.00.
" 8 "	I. Graveson.....	5 00.
" 15 "	Perry Bros.....	5 00.
" 19 "	Salem-Bedford Stone Co.....	14.85.
" 21 "	Dark Hollow Quarry Co.....	25.00.
" " "	Forest City Stone Co.....	5.00.

THE CONVENTIONS.

November 22, 1892.	Goddard & Co.	\$19.85.
" 23 "	Grafton Stone Co.	5.00.
December 1, 1892.	Maxwell, Rolf & Co.	24.75.
" 21 "	Jno. Diebold.	5.00.

DISBURSEMENTS.

\$1,855.76.

February 9, 1892.	Expense of executive committee to Nashville, Tenn.	\$100.50.
	Secretary's salary for February to December, inclusive	787.50.
	Incidental expenses	63.64.

\$951.64.

Correct: Balance on hand..... \$904.12.

C. W. McCORMICK, A. F. CADEN,
Auditing Committee.

In December I sent out notice for this meeting, and also a revised list of our membership, as follows:

Officers: President, J. H. Peter, Louisville, Ky.; vice-president, Geo. Pickel, St. Louis, Mo.; treasurer, M. A. Blatz, Louisville, Ky.; secretary, B. A. McGee, Bloomington, Ind.

Executive Committee: J. H. Peter, Geo. Pickel, M. A. Blatz, E. J. Stamm, W. L. Malone, J. G. Bodenschatz.

Contractors: Blatz & Krebs, Louisville, Ky.; John Boyle, Cincinnati, O.; James P. Byrne, Cincinnati, O.; Buckeye Marble and Freestone Co., Cincinnati, O.; L. C. Buente, Cincinnati, O.; J. J. Cain & Co., Nashville, Tenn.; Central Stone Co., St. Louis, Mo.; Wm. Clark, St. Louis, Mo.; Driver Bros., Hamilton, O.; M. G. Dermody, Memphis, Tenn.; D. E. Denny, Nashville, Tenn.; John Diebold & Son, Louisville, Ky.; Dewar, Grandison & Co., Memphis, Tenn.; James Farrell, Covington, Ky.; Isaac Graveson, Cincinnati, O.; Wm. Graveson & Co., Cincinnati, O.; Samuel Goddard & Co., Indianapolis, Ind.; David Hummel, Cincinnati, O.; G. Ittenbach & Co., Indianapolis, Ind.; J. Kastner & Co., Memphis, Tenn.; Kelly Bros., Chattanooga, Tenn.; Kellinghaus & Knissell, Cincinnati, O.; Klekamp, Steman & Co., Cincinnati, O.; Melcher & Herley, New Albany, Ind.; Wm. Maddox, Nashville, Tenn.; Jno. Oman, Nashville, Tenn.; Pielage & Marsch, Cincinnati, O.; Pearce & Morgan, Indianapolis, Ind.; Peter & Melcher, Louisville, Ky.; Peter & Burghard, Louisville, Ky.; Pickel Stone Co., St. Louis, Mo.; Geo. Pickel & Bro., St. Louis, Mo.; F. Quigley, Memphis, Tenn.; Robbins Bros., Atlanta, Ga.; J. H. Schmid & Co., Indianapolis, Ind.; F. P. Stewart, Hamilton, O.; Peter Swan, Nashville, Tenn.; St. Louis Cut-Stone Co., St. Louis, Mo.; John Trout, Chattanooga, Tenn.; Waters & Searle, Nashville, Tenn.; L. H. Weber, Dayton, O.; A. Youngblood, Indianapolis, Ind.

Quarrymen: Ashland Brownstone Co., Chicago, Ill.; Bodenschatz-Bedford Stone Co., Chicago, Ill.; Babcock & Smith, Houghton, Wis.; Bayfield Brownstone Co., Bayfield, Wis.; Belknap & Dumesnil Co., Louisville, Ky.; Bedford Quarries Co., Bedford, Ind.; Buena Vista Freestone Co., Cincinnati, O.; Big Four Limestone Co., New Point, Ind.; C. C. Bode & Son, Portsmouth, O.; Big Creek Stone Co., Stinesville, Ind.; Bloomington Oolitic Stone Co., Bloomington, Ind.; Bedford Stone Co., Bedford, Ind.; Cleveland Stone Co., Cleveland, O.; Chicago and Bedford Stone Co., Bedford, Ind.; Corydon Stone Co., Corydon, Ind.; F. R. Caden & Co., Evansville, Ind.; Dark Hollow Quarry Co., Louisville, Ky.; Detroit & Hocking Valley Red and Brownstone Co., Detroit, Mich.; Furst, Jacobs & Co., Chicago, Ill.; Forest City Stone Co., Cleveland, O.; Greensburg Limestone Co., Greensburg, Ind.; Grafton Stone Co., Grafton, O.; Kentucky Stone Co., Cincinnati, O.; Jno. Miller & Sons, Buena Vista, O.; Malone Stone Co., Cleveland, O.; Maxwell, Rolf & Co., Cleveland, O.; North Bedford Stone Co., Stinesville, Ind.; Owen Oolitic Stone Co., Spencer, Ind.; Oolite Stone Co., Spencer, Ind.; Ohio Stone Co., Cleveland, O.; Perry, Matthews & Buskirk, Bedford, Ind.; Perry Bros., Ellettsville, Ind.; Prentice Brownstone Co., Ashland, Wis.; Peerless Stone Co., Bedford, Ind.; Portage Redstone Co., Chicago, Ill.; David Reed, Bedford, Ind.; Salem-Bedford Stone Co., Louisville, Ky.; Spider Creek Quarry Co., Bedford, Ind.; W. R. Smith & Sons, Otway, O.; A. R. Stewart, Nashville, Tenn.; Tan-Yard Stone Co., Bedford, Ind.; Terre Haute Stone Co., Terre Haute, Ind.; Thomlinson Stone Co., Smithville, Ind.; Virginia Brownstone Co., Hinton, W. Va.

Respectfully submitted,

B. A. MCGEE, Secretary.

Treasurer Blatz made his report, as follows :



January 26, 1892.	Balance	\$1,037.06
" " "	Received from secretary	305.00
February 11, 1892.	Sundries	50.00
" 29 "	Wm. Clark	30.00
March 15, 1892.	Ohio Stone Co.	20.00
" " "	Furst & Co., \$10; Perry Bros., \$25.	35.00
" 19 "	Belknap & Dumesnil	9.85
" 21 "	Prentice Brownstone Co.	10.00
" " "	Terre Haute Stone Co.	15.00
April 4, 1892.	Forest City Stone Co.	20.00
" " "	Spider Creek Quarry Co.	15.00
" 6 "	Bedford Oolitic Stone Co.	10.00
May 6, 1892.	Buena Vista Freestone Co.	20.00
June 14, 1892.	Big Four Stone Co.	20.00
" 24 "	Peter Swan	10.00
August 2, 1892.	J. H. Smith & Son	15.00
September 5, 1892.	David Reed	25.00
October 27, 1892.	Sundry checks (Perry, Matthews & Buskirk, \$5.00; Peter & Melcher, \$5.00; Portage Redstone Co., \$5.00; Furst & Co., \$5.00; W. R. Smith, \$5.00; James Farrell, \$5.00; Pickel Stone Co., \$5.00; David Reed, \$4.40)	39.40
" 29 "	Sundry checks (Corydon Stone Co., \$5.00; John Troutt, \$5.00; Peerless Stone Co., \$5.00)	15.00
November 2, 1892.	Sundry checks (Malone Stone Co., \$5.00; Blatz & Krebs, \$5.00; Peter & Burghard, \$5.00; Belknap & Dumesnil, \$5.00; G. Ittenbach & Co., \$5.00)	25.00
" 5 "	Bedford Stone Co.	5.00
" 7 "	Cleveland Stone Co.	15.00
" 8 "	I. Graveson	5.00
" 15 "	Perry Bros.	5.00
" 19 "	Salem-Bedford Stone Co.	14.85
" 21 "	Dark Hollow Quarry Co.	25.00
" 21 "	Forest City Stone Co.	5.00
" 22 "	Goddard & Co.	19.85
" 23 "	Grafton Stone Co.	5.00
December 1, 1892,	Maxwell, Rolf & Co.	24.75
" 21 "	John Diebold	5.00

\$1,855.76

DISBURSEMENTS.

February 9, 1892	B. A. McGee, expenses to Nashville	\$26.30
" " "	W. L. Malone	36.00
" " "	J. H. Peter	19.10
" " "	M. A. Blatz	19.10
March 9, 1892.	B. A. McGee, secretary	47.60
April 4, 1892.	"	81.49
" 22 "	"	92.25
June 9, 1892.	"	79.50
July 6, 1892.	"	78.00
August 7, 1892.	"	75.00
September 7, 1892.	"	76.00
October 7, 1892.	"	75.00
November 7, 1892.	"	78.00
" 22 "	"	.20
December 6, 1892.	"	89.10
January 3, 1893.	"	79.00

\$951.64

Balance

\$904.12

On motion reports of secretary and treasurer were referred to an auditing committee consisting of Messrs. Caden and McCormick, who approved same.

The question of complaints and excuses relative to dues and fines then came up for discussion and by consent the Bedford Stone Quarries Co., was listed in place of Oölitic and Hoosier quarries. Mr. McCormick spoke on the subject of the benefits of fines to the association. He deprecated the practice of levying fines for absence. He believed in a mutual relation of the quarrymen and contractors on a business basis by which a system of fines and penalties be established for unfair business conduct among members. Thought that such a rule could be formulated and be made operative.

President Peter invited discussion relative to the abolishment of fines for absence. Mr. Matthews indorsed Mr. McCormick's ideas—success of the organization depended upon furthering the combined interests of the quarry owners and cut-stone contractors. Membership in the association had given very little advantage to quarry owners thus far, aside from the enjoyable social features; would suggest appointment of committees to formulate plans for the firmer amalgamation of the two interests. Mr. Winstandley felt keenly the lack of advantage accruing to the quarry owner in contractors' associations. He believed an arrangement should be made for reciprocal advantages. Was not prepared to suggest measures—favored Mr. Matthews' project of a committee to investigate the needs and requirements of both interests. Thought that a further amalgamation of the interests of cut-stone contractors and quarrymen would tend to increase the membership of the association, since there would be an incentive for those in both trades to come in. Members were here to protect their own interests and make business more profitable—was strongly in favor of formal action at next session of the present meeting.

Mr. Malone said he had asked some of the northern Ohio quarrymen to visit the convention and was met with the rejoinder that the association was without purpose so far as quarrymen were concerned, and there was no incentive to join it. He favored a committee to equalize the advantages.

Mr. McCormick thought the convention should go into a committee of the whole on the question, as each quarry owner and cut-stone contractor had his own peculiar views and interests. If, as had been said, the constitution and by-laws cared for the quarrymen with special provisions, he wanted to see an earnest fulfillment of its requirements. Cut-stone contractors should uphold prices—under existing conditions purchasers of stone reaped all the benefits. The quarrymen and contractors did not get what they were entitled to. Protection of the quarry owners' interests meant protection to the contractor.

Mr. Grubb related business-like procedure of the Alleghany association in certain cases involving combined interests of quarry owners and contractors. Favored adoption of similar methods by this association.

President Peter appointed Secretary McGee chairman, and took part in the debate. He related how the coöperation of the quarrymen with the cut-stone contractors of his city had been of great benefit to them. Disgruntled cutters had organized against their former employers and started a coöperative shop. Quarry owners in the Ohio association refused to sell them stone and defeated their plans. Quarry owners had done this for contractors and he believed contractors should reciprocate. Was strongly in favor of contractors confining their purchases to members of the Ohio association. There is a wofully small margin to quarrymen at present prices. He believed contractors could pay more for their stock and not lose a dollar. He wished to be understood as favoring reciprocity.

Mr. McGee considered the appointment of a committee as the most feasible plan of arranging the matter. Discussed in the abstract by the convention would be too lengthy. Preferred to have report of committee tendered and discussion follow. Moved that a committee of three be appointed

Mr. McCormick thought that this committee should be instructed to fix up a price-list governing sales made to members of the association to be submitted by quarrymen and to be held inviolate after its adoption. An amendment was offered to the original motion that committee consist of five. Amendment accepted and motion carried.

The chair appointed as members of the committee, Messrs. McCormick, Adams, Winstandley, Caden and Blatz. On motion of Mr Kessing a committee of three was appointed to draft resolutions of respect to the memory of John Mueller, deceased—Messrs. Chipman, Emery and Kessing were appointed to serve as such committee. Adjourned until 10 a. m. following day.

WEDNESDAY MORNING.

Meeting was called to order at 10 a. m.

Committee appointed at close of previous session submitted the following:

REPORT OF COMMITTEE ON RESOLUTIONS.

The committee on resolutions after due consideration beg leave to offer the following:

WHEREAS, It has pleased an allwise Providence to call suddenly from our midst, and from the scene of his labors, our esteemed friend and co-worker, John Mueller, of Cincinnati; and,

WHEREAS, He had by his genial manner and business integrity endeared himself to all, therefore, be it

Resolved, That we deeply deplore his loss, and that by his death the Ohio Valley Cut-Stone Contractors' and Quarrymen's Association has lost a valued and efficient member; and be it further

Resolved, That these resolutions be spread upon the records of the association.

FRANK KESSING
W. E. EMERY.
J. W. CHIPMAN.

Resolution adopted.

The question of fines came up again for discussion, following motion by Mr. Bollenbacher that same be remitted. Messrs. McGee, Chipman, Bollenbacher, Peter and Graveson participated in the debate, which terminated in

a motion that the cases be acted upon separately. The fines of the following concerns for non-attendance at a meeting were accordingly remitted: Cleveland Stone Co., Cleveland, O.; Salem Stone and Lime Co., Bedford, Ind.; F. Quigley, Memphis, Tenn.; F. P. Stewart, Hamilton, O.

The committee appointed to revise constitution and by-laws submitted the following amendments:

That Article V of the Constitution and By-Laws be amended to read as follows: Any member of this association not meeting his liabilities to any other member of this association, or not conforming to the letter and spirit of the Constitution and By-Laws of this association, can or may, upon investigation by the executive committee, be suspended and deprived of all the benefits of this association, until the next regular meeting, when the case shall be finally settled for or against such member by a two-thirds vote of the members present.

That Article III, Section II, be amended to read as follows: All members must pay their initiation fees and dues before being entitled to the privileges of this association, and upon failure to do so, sixty days after being notified by the secretary of such fees being due, shall be suspended and deprived of all the rights and privileges of this association. The secretary shall notify all the members of such suspension.

That Article VIII shall be made to read as follows: First, the quarrymen, members of this association, on or before the 10th of February in each and every year, shall furnish to the stone cutters, members of this association, copies of the list of prices and terms and discounts, etc., at which each of its members will sell stone to the stone cutter members of the association during the ensuing year, and furnish the secretary of the association with a copy of same. These prices thus stated shall not be departed from either by way of increase or of decrease without the assent of the majority of the executive committee. Second, each member of the stone cutters of this association agrees to buy at said prices, and none other, of the quarrymen members of the association. Third, each quarryman member agrees to sell to stone-cutter members of the association at said prices and at none other. This agreement shall be considered as violated by any device of any sort or kind by which in any way a less or higher price shall be named or obtained.

That Article VIII as now printed in the By-laws shall be numbered Article IX, and read as it now does.

That the jurisdiction of this association shall include the following cities only, for the present at least: Memphis, Tenn.; Nashville, Tenn.; Louisville, Ky.; Cincinnati, O.; Indianapolis, Ind.; New Albany, Ind.; Hamilton, O.; Dayton, O.; Chattanooga, Tenn.; and Evansville, Ind.

Respectfully submitted, *C. W. McCormick, Chairman.*

Moved by Mr. Ittenbach that it be accepted and left open for discussion. Carried.

A lengthy debate followed the reading of the clause relative to schedule of prices to be promulgated by quarry owners. Mr. McCormick offered the following amendment to article 2, section 3, of the constitution:

The secretary shall keep a record of all proceedings of this organization; shall conduct all correspondence and shall notify members of all regular and call meetings, and notify all members of the admission of new members as soon as they are admitted. Also notify members of the board of arbitration of the time, object and place of their meetings, collect all dues and turn the same over to the treasurer and take his receipt therefor. He shall also in conjunction with the president, certify to all just claims against this organization, and issue an order for payment of same on the treasurer.

Adopted.

On motion of Mr. McGee amendment of section 4, article 8 was laid on table. On motion of Mr. McGee report of committee was adopted with amendment by Mr. Marine that in subsequent issues of printed constitu-

tion and by-laws, the names of all members be incorporated and grouped by cities, with street address, etc.

The resignation of the Terre Haute Stone Co., which had discontinued business, was read and accepted. Letter of regret from J. G. Bodenschatz, of Chicago, and others were read and placed of file. A report of the executive committee's visit to Nashville was given by Mr. McGee, supplemented by remarks from Mr. Oman.

President Peter here read a paper on

STRIKES, THEIR EFFECTS AND REMEDIES.



We who are considered the capitalists may view a strike in a different way than those who participate in it. A government which is being disrupted by insurrection calls the uprising rebellion, mutiny, sedition, but those taking part will call it revolution, a political change, or give it some laudable name. So in the matter of strikes, boycotts, lockouts and the like—we call it lawless and disorderly; the striker thinks it just and equitable. So in this brief address though I may not suit the opinions of every man, I give my own frank judgment of disturbances in the trades.

Whenever a set of men combine and demand a change in wages or customs, emphasizing their demands by cessation from labor, this is a strike, and organized labor uses this medium to force their employers to accede to its demands, which may or may not be just, and these uprisings are often the cause of violence and bloodshed.

The relations between employer and employe should be friendly, the employer recognizing the skill of his mechanic and giving him suitable remuneration, remembering the "laborer is worthy of his hire;" and the employe should appreciate the kindness of his employer, give consideration to the fact that the path of the employer is not always strewn with roses, but sometimes abounds with thorns of business anxieties.

But frequently the mechanic assumes that his employer represents capital, and pictures him as one who is his arch enemy, and thus in the beginning an avowed hatred exists against the very one who is the source, in some respects, of his livelihood. Thus the employe works as if he is serving a taskmaster, considering that only his labor has created the relation of employer and employe, without considering that his employer has probably begun, like himself, at the bottom of the ladder, and by thrift and intelligence has secured this eminence. He forgets that in proportion to the advantages that accrue to the position of employer, that the troubles and worry are manifold, with its financial crises, the active competition in trade, the uncertainty of things, and other matters which every business man understands.

I am wandering from my subject, "Strikes, Their Effects and Remedies." In regard to their effects, it is patent that a strike, arousing the dormant passions of a man who is no doubt true to his convictions, brings in its wake waves of violence and bloodshed. Organized labor is a good thing. I am in favor of it when it confines itself to benevolence and charity, seeking to educate and elevate, to alleviate the condition of the working man, for he knows he has worse enemies than his employers. Such should be the domain of the labor organization, to protect itself at the ballot-box, as one of their sincere leaders says; to recognize that compulsion is not always the most just way; to make the comfort and contentment of their homes their only wish, instead the domiciles of want and squalor.

But such associations often become the stool-pigeons of political henchmen, the tools of unprincipled men who care nothing for the prosperity or welfare of their fellowmen, the school where labor agitators graduate—persons who would commit any crime for their personal aggrandizement: such trades unions then become a menace to the community and should not be tolerated.

F—Stone.

Drive such men from their counsels. Let their constitutions and by-laws conform to right and reason, recognizing the privileges of others, for in this country we should have equal civil rights; let them construe everything liberally and carefully, and not with prejudice and hatred; if abuses are prevalent let them make manly requests, and in conservative and reasonable manner, and then the relations between employer and employe would be of the most pleasant nature.

Strikes! What sufferings and distress they have caused. Look at the great railroad strikes, and the demoralization and injury they have occasioned! Hunger, want, famine, violence, destruction and death goes hand-in-hand with these outbursts, with irreparable injury to all classes, the brunt always falling on those not able to sustain it—the laboring masses. Before the great Burlington strike a large number of the railroad employes owned cozy little homes that stretched in a continuous line from Illinois to Texas—a fitting testimonial to thrift, industry and contentment. But this could not continue. The walking delegate, or others seeking notoriety, must dwell on conditions that never existed, inequalities of wages that only found creation in their minds, and circumstances that were invented. A strike must prevail, and its consequences were that the operations of the road were stopped, industry paralyzed, and want and suffering occasioned. Ninety per cent. of the homes of those engaging in the strike were covered with mortgages. Organized labor did not win this fight, it rarely does, for the leaders and walking delegates take the credit of any victory as a personal triumph. What care they how much the mechanic or the employer loses? Their grievances must be satisfied, and then labor is vindicated.

Look at the Homestead strike. Men who were skilled in their vocation were receiving such wages that others were induced to come and share in the common prosperity. From a hamlet it grew into a town, where nearly every mechanic was a property-owner, where want was a stranger, and contentment was the password. A change of prices was demanded, but supply and demand could not stand it, for this condition governs all remuneration, and the demand was refused. Result, a strike of such magnitude, of such ferocity, that the community was horror-stricken. Wise counsel was there, but in the minority, and scenes were enacted that would bring a blush of mortification to every true-principled and conscientious mechanic. Violence and havoc on all sides, destruction and murder rampant. The consequence is to-day there are over three hundred starving families in that little town where peace and plenty had abounded. It was worse than a pestilence in its effect, this strike, but what cared the agitators so long as their views were not entertained!

Such illustrations are numerous, and are invariably the result of disturbances in the trades, with more or less degree. Do not understand me, gentlemen, to say that the employer is always blameless. Not so. There are employers that treat their men with contempt, their only object being to secure the most work at the smallest possible remuneration, with a disposition to crush what is manly and intelligent in their men, and asserting in a tyrannical manner their authority over those that are unfortunate enough to be obliged to work for them, in such a degree that slavery is oftentimes preferable to service in such employment. But fortunately such cases are few, and the employe soon discovers these traits and seeks work elsewhere.

In relation to remedies, there is only one when an issue is raised, and that is arbitration. But if the relations between employer and employe are pleasant, the necessity of arbitration is not required. Employers should tolerate no dictation nor interference in their affairs, but at the same time should avoid any authority that smacks of tyranny; the employes should and must expect to be governed by orders from their employers, and under all circumstances treat their superiors with respect, avoiding insolence, and shunning any one that advises mutiny. The employer who recognizes in their men the same degree as his customers, *i. e.* civilly, will find that his men will appreciate such treatment. No fawning or servility on either side—dutiful obedience for the one and common courtesy for the other.

My impression is that the majority of those who earn their bread by the sweat of their brow entertain the right views before joining trades-unions, but coming in contact with anarchistic opinions, they become stultified in their appreciation of their obligations to their employers, become dissatisfied with their station in society; assembling with lawless men, they become neglectful, insolent, and finally their actions become intolerant. If these men would surround themselves with home influences, in lieu of those often selected, I warrant you that you would see more numerous specimens of the noblest work of God—an honest toiler.

Thrift, industry and temperance contrasted with neglect of business and dissipation,

make two classes in the society of this country, even if we are created equal. As you cannot force, with any degree of justice, the man of plenty to distribute his property equally to all, these conditions will remain; but the relations between these classes can be made pleasant, first by moral obligation, of which I have spoken in the duties between employer and employe, and should this fail, in lieu of strikes and the like then let us have legal arbitration. In some of our States, standing committees of arbitration are appointed, and Congress has taken cognizance of this method of settling disputes between the employer and the employe, but as yet no national law governs the subject. In this progressive age, when the universal tendency is toward combinations and associations, often the prime object of ameliorating the conditions between capital and labor is lost sight of, and instead of bettering the situation, these organizations, with a selfish desire on either side, clash together, and then the government must intervene, and legal arbitration is necessary, for the government assumes that such contentions interfere with the rights of society, and act accordingly. Arbitration is the bearing of controversy and dispute by impartial men, and it is my opinion that the employers and employes of the localities pursuing some particular trade, should have fixed and consistent rules between them, for the guidance of their several duties to each other, and if an issue arises which defies settlement by their joint boards, then the matter should be determined by some public officer, such as our federal judges, whose award should be final, and create as much respect as their decisions in civil cases which are brought before their tribunal.

Gentlemen, as your chief officer, I advise your secretary to incorporate in his program such addresses as he believes would interest the association, for in the discussion which will follow each subject, we, one and all, will learn something that may be an advantage to us, and in this humble effort to begin such a mode of business at our conventions, I hope you will bear with me and say, "All's well that ends well."

Sylvester Marshall, president of the National Association of Quarry Owners, was introduced and read the following paper, entitled

NATIONAL ORGANIZATION OF QUARRYMEN.



The building-stone trade of the country is not in a satisfactory condition. We all must admit that for the past two or three years the profits have been decreasing while the volume of business has been gradually increasing. This condition is not the result of over-production, nor is it the result of excessive competition, although the latter has been more or less of a factor. Other uncontrolled agencies have been at work, which will eventually result in a demoralization of the stone industry, unless prompt and decisive action is taken by those most interested. I have made an attempt to study the existing conditions in the stone trade and must confess that the outlook for immediate relief is not flattering, unless concerted action is taken at once by the producers. The conditions into which we have drifted through apathy, are so complex in character that it is going to take prompt and intelligent action on the part of the producer to remedy

them, and it is only by the united action of the quarrymen that anything can be accomplished. In a letter recently received from one of the largest quarrymen in the state of New York, comes this statement: "Our experience for the past three years has been an increase of sales with a decrease of profits. We sincerely hope that the National Association, at its February meeting, will be able to afford us some relief." Again, one of the largest quarrymen of the West said to me a few days since: "Our sales for the past year were the largest we ever made, yet the profits were fifty per cent. less than on a much less volume of business done in the year 1890." So far as I have been able to learn, this has been the experience of nearly every producer.

Gentlemen, let us analyze the situation and endeavor to ascertain wherein lie some of the factors that have been instrumental in demoralizing prices, and reducing profits. We will discuss three of the more important agencies that menace the prosperity of the quarryman: First, one of the principal causes for the lowering of prices has been the entrance of individuals and companies into the business with insufficient funds and little or no practical experience. Lack of experience and insufficient funds, in the majority of cases, caused them to cut prices so they could quickly obtain money to meet

current expenses. Second, under the present system of measurements, the quarryman is compelled to lose a large percentage of his profits every year. Third, the present rule of quoting prices "F. O. B." cars at destination is misleading and unsatisfactory to quarrymen, and is, also, the source of large losses.

Until a comparatively short time ago the business of stone-quarrying had enjoyed a long period of prosperity. The decade from 1880 to 1890 was the most prosperous period in the history of the country, for quarrymen. Old quarrymen present will recollect the difficulties met with in filling orders. Good prices prevailed and the books at the end of the year showed satisfactory results. This very season of prosperity was largely instrumental in bringing about the present unsatisfactory trade conditions. During this decade the material interests of the country enjoyed a period of unparalleled prosperity. Capital accumulated and sought investment. To the eye of capital the stone business afforded exceptional inducements. They reasoned thus: "These stone men are making money. The tendency of the age is to build a better and more substantial class of buildings. Stone is Nature's building material. Its consumption is bound to increase. The territories producing a first-class building stone are limited. If the consumption is increased, a supply must be produced to equal the demand. Reasoning from this standpoint, there is no reason why the business should not prosper in the future as in the past." They launched forth in the business without any adequate conception of its requirements. Men were placed in charge with little or no practical experience. In many cases, dimes were furnished those with whom they had intrusted the management for opening a quarry and establishing a business, where dollars were required. In some localities over-production ensued and stock accumulated. In most cases, the old quarryman, who had done business on a conservative basis, was in a position to wait until a demand should come for his product. Not so with the new man. Investors were clamoring for dividends, and current expenses must be met. Under these conditions the inevitable was bound to happen. Prices were cut, until, in many cases the selling price was actually below the cost of production. We all know that cutting of prices in one locality will materially affect the selling prices in nearly every other producing district.

Gentlemen, the stone-quarrying industry is passing through a crucial stage. The time has come when we must lay down proper rules and regulations for the government of our business. This is an age of concentration of interests. Other industries have been forced, through necessity, to organize strong associations and establish rules and regulations for the government of their individual members in conducting their business. If we do not want our business reduced to a condition of paralysis, we must act. To act, we must organize, and an organization once established must have, in order to be effective, the earnest assistance of all the producers.

We now come to our second and third agencies that menace the prosperity of the quarrymen, namely, the question of measurements, and the quotation of prices at destination. As the two are so closely allied we will discuss them together. The present system in vogue for measuring stone is a source of great loss to the producer. It is away behind the age. We quarrymen have not kept pace with the changed conditions which have sprung up in every branch of industry in the past few years, but have continued to do business on the old foggy principles laid down by our forefathers, which should have been discarded twenty years ago. In the first place, a uniform standard of measurement should be adopted. The prevailing sentiment among the quarrymen of the country seems to favor selling stone by weight, and discarding the old forms of selling by the cubic foot, cord, perch, or yard, as being too cumbersome, and allowing too many leaks. Two principal agencies work against the quarrymen in this respect: First, through lack of organization we are at the mercy of the railroad companies in the payment of freights. Second, through dishonest middlemen who make a practice of discounting all quarry measurements. We will first take up the question of freights. If the quarryman was alive to his interests he would pay no freights. In the first place, all prices should be quoted F. O. B. cars at quarry. In the second place, all stone should be sold by weight instead of by the cumbersome, misleading and unsatisfactory method now in use of selling by the cubic foot, cord, perch and yard. By quoting prices at quarry, and establishing a uniform standard of measurements, and selling by weight, one of the many sources of loss now met with by the quarrymen would be eliminated. The present system allows the dishonest contractor,—a few of this class are found in all large cities,—to rob both the quarryman and the honest contractor. It was stated on the floor of the convention in Chicago last February, that certain contractors in a given city made it their boast that they always cut the quarry measurement ten per cent. on

all consignments of stone received at their yard. To follow this up, we will take an example to show how misleading are the apparent profits of the quarryman, on an order of, say, 10,000 cubic feet consigned to one of these dishonest contractors, at prices quoted F. O. B. cars at yard of consignee. Now, the following figures may seem a little complex at first glance, but I ask you to carefully analyze them and then I believe you will see why your profits at the end of the year are so unsatisfactory. You will at least, see one great source of loss to the producer.

Mr. A., a producer, receives from Mr. B., one of the contractors above referred to, an order for 10,000 cubic feet of stone. The railroad company is wiser than the producer, and charges freight by *weight* instead of by the quarry invoices of so many cubic feet. The railroad company as a rule, does the weighing, and after the producer receives the receipted freight bills from the consignee, he finds that he has paid freight on from ten to twenty-five per cent. more stone than he shipped. He finds that his freight charges make his stone average in weight from 180 to 200 pounds per cubic foot, where it should not have exceeded 160 pounds. This is loss number one, and we will say amounts to three cents per cubic foot. The consignee makes good his boasts, and discounts the quarry invoices ten per cent. On 10,000 cubic feet of stone this would amount to 1,000 feet. We will say the selling price at destination is fifty cents per cubic foot, and the freight, if it had been correctly weighed, would have been twenty cents per cubic foot; 1,000 feet at fifty cents per foot amounts to \$500. Now, right here is where the producer is apt to overlook a very important fact. *He not only loses the market price of the stone at fifty cents per foot, but he at the same time is compelled to pay freight on the stone stolen from him.* This at twenty cents per foot amounts to \$200. Then the three cents per foot he pays for excessive freight charges on 10,000 cubic feet of stone, amounts to \$300. We will recapitulate the losses: Loss by discount on quarry invoices of ten per cent. or 1,000 feet, at fifty cents per foot, \$500; loss by excessive freight charges, at three cents per foot on 10,000 cubic feet, \$300; loss by freight paid on stone discounted, amounting to 1,000 feet, at twenty cents per foot, \$200; total, \$1,000.

We will now show why the apparent profits to the producer are so misleading under the present system. We will say his cost for quarrying and loading on cars is fifteen cents per cubic foot. The freight rate to destination is twenty cents per cubic foot, making actual cost at destination thirty-five cents. If the stone was sold at fifty cents per cubic foot, his apparent profit would be fifteen cents per foot, or \$1,500 on a consignment of 10,000. When he comes to settle, however, he finds that instead of his books showing a profit of \$1,500 on this order, the amount he has actually made is reduced to \$500, or a loss of sixty-six and two-thirds per cent. on his apparent profit.

Gentlemen, how many of you have had experiences of this kind? Is it not high time that a different system was adopted? There is no industry in this country of any magnitude that would tolerate such loose business methods for one hour. Not only is the quarryman made to suffer through this loose system, but the honest contractor has to suffer as well. The dishonest contractor who discounts the invoices as above described, can underbid the honest contractor and still make more money than the latter. By adopting a general rule among quarrymen, selling by weight only, and quoting prices on board cars at quarries, all contractors would be placed on an even footing, and the quarrymen would be in position to control the situation.

Individuals and local associations cannot bring about these needed reforms. They can only be brought about by a strong national association working in harmony with auxiliary associations, in all the stone-producing districts throughout the country. In studying these questions, I have come to the firm belief that if the stone-quarrying industry was properly controlled, the profits to the producer could be doubled, even at prevailing prices. I will also venture to say, that there is not a stone-producing district in the United States where prices could not be raised twenty-five per cent. or more, and still do as large a volume of business as was done during 1892. It is possible that the present era of low prices in building stone will eventually prove a blessing in disguise. First, cheapness will cause greater consumption, and a subsequent increased demand for all time. Second, the narrow margin of profits left us will be an incentive to the exercise of a more rigid economy in producing, and will bring about a better system of conducting our business. Improved machinery and better quarry appliances will become an absolute necessity. We have followed the methods of our forefathers too long, and we are now placed in a position where we must strike out on new lines and follow new ideas for our betterment.

Then, too, the jealousies existing among the producers in given districts are another cause of weakness which must, in some way, be controlled. This can only be controlled

by organizing an association formed by the producers of that district, and establishing rules for the government of its members. Another matter I desire to call your attention to, is the high price the consumer is compelled to pay for stone by the time it is placed in his building. The high price at which stone is figured, by the time it is placed in the building, (and, by the way, the producer is not a party to this high price), reacts against the quarryman, and in many cases is prohibitory to the use of stone. As a consequence, pressed brick and terra cotta are used in immense quantities all over this broad land every year, where stone, Nature's best building material, should be used. The producer of buff Bedford stone receives for his product twenty cents per cubic foot at quarry. After it passes through the hands of the railroad company and middleman, and is placed in the walls of a building in Chicago, the cost to the consumer amounts to about \$1.50 per cubic foot. The price received by the producer is, therefore, entirely disproportionate to the cost paid by the consumer.

Gentlemen, these are facts. They are facts, too, that are not to the credit of the quarrymen. You ask how we shall go about it to revolutionize our present methods of doing business. My reply is, by organization, or, by properly supporting the associations already formed. The National Association is only, as yet, in its infancy. When I started out in my work last spring, in the interest of the National Association, I found myself hampered on all sides. I was instructed to have copies of the constitution and by-laws printed, together with a condensed report of the proceedings of the convention, and mail the same to all the leading quarrymen in the United States. I discovered that there was not a printed list of quarry-owners in existence. Here was a business in which is invested an approximate sum of \$100,000,000, ranking third among the non-metallic industries of the country, yet the commercial men and the commercial agencies had not thought the industry of sufficient importance to compile a list of the producers. At an expenditure of considerable time and money, I succeeded in getting a working list of over 1,200 quarries, and commenced to flood the country with circulars. But little interest was taken by those who should have given me assistance. In fact many of the members of the National Association afforded me no assistance whatever, not even paying their membership fees. I had not been engaged in work of the National Association but a short time before I made the discovery that we were not proceeding on the right plan. It seems to me that the proper method would be to start in and select some competent man, who is thoroughly familiar with the business, pay him a sufficient salary, and let him devote all his time and best energies to the association's work. Let a general plan be outlined upon which to work. Let him organize local associations in stone-producing districts. Then let these local associations be auxiliary to and members of the National Association, the expenses of the National Association to be met out of the treasuries of the local associations. Allow the local associations to send delegates to meetings of the National Association, say one delegate to every fifteen members of the local association and have his expenses paid by his association. We would then be in a position where we would be able to bring about the reforms spoken of in this paper, and many other reforms that I have not even touched upon. I will say, however, that it is utterly useless to undertake to run the affairs of a national association through an individual who cannot devote all his time to the work.

Hoping, gentlemen, to see all the quarrymen members of the Ohio Valley Association at Chicago, February 21, I thank you for your kind attention.

Concluding his remarks, Mr. Marshall invited the quarry owners present to hold an informal discussion late in the afternoon as to ways and means of strengthening their national association. On motion a vote of thanks was tendered Mr. Marshall. Meeting adjourned until afternoon.

AFTERNOON SESSION.

Immediately upon being called to order the convention proceeded to elect officers for the ensuing year. Mr. Jos. H. Peter, of Louisville, was nominated for re-election as president, as was also Mr. Blatz for treasurer. Mr. Chipman was nominated for vice-president. Messrs. B. A. McGee and W. E. Emery were put in nomination for secretary and Messrs. Ittenbach, Graveson and McGee for executive committee. The election was by ballot and

resulted as follows: President, Jos. H. Peter, Louisville; vice-president, J. W. Chipman, Indianapolis; secretary, W. E. Emery, Bedford; treasurer, M. A. Blatz, Louisville; executive committee, Frank Ittenbach, Indianapolis, Isaac Graveson, Cincinnati, B. A. McGee, Bloomington.

At this point Mr. Ranck, of the local committee, was recognized, and on behalf of the local contractors and quarrymen extended an invitation to the gentlemen present to attend a banquet at the Columbia Club in the evening. The invitation was not made to the association, but as a personal one to those present, the association at St. Louis meeting having voted not to accept such courtesies. The invitation was received with unanimous approval.

Cincinnati and Louisville were placed in nomination for next meeting place; the choice of the convention falling upon the latter city.

Adjourned.

THE BANQUET.

Members and invited guests assembled in the rotunda of the Denison at 9 P. M. Wednesday and under escort of the local committees proceeded to the Columbia Club house on the Circle. Chief Caterer Rouser had prepared the parlors and banquet hall in an attractive manner. A half hour of social intercourse and inspection of the beauties of the elegant apartments was spent prior to the opening of the doors of the banquet hall, the visitors being introduced to Gov. Matthews and other of the distinguished guests in the meantime.

Promptly at 9:30 the company filed into the banquet hall, each gentleman taking his place at the table and remained standing until Toastmaster Henry C. Adams, in a pleasing speech of welcome, bade them be seated. To the music of Panden's superb orchestra the following *ménú* was served:

— MENU. —		
Manhattan Cocktail.		Blue Points.
Soup, Cream or Chicken.		Amontillado.
Roast Turkey, Oyster Dressing.		
	French Peas.	
Santa Cruz Rum.		Claret.
	Oranges.	
	Fillet of Beef, Mushroom Sauce.	
	Potatoes Anglaise.	
Chicken salad.		Champagne.
Bentz Crackers.	Ice Cream, Assorted Cake.	
	Brie Cheese.	
	Black Coffee.	Cigars.

Interspersed in the feast lively songs were rendered by the "Bald Head Sextette," composed of Messrs. Thompson, Brown, Woodward, Tarkington, Wallace and Butler, all prominent Indianapolis gentlemen, who sing for the love of it, and whose songs and the manner in which they render them, are recognized as the very best entertainment that could be provided for an occasion of this sort. They "set the table in a roar," every time they arose.

If there is any better toastmaster living than Harry Adams—one of quicker wit or more eloquent—he has not come forth up to date. Gov.

Claude Matthews was the honored guest of the occasion, and delivered a masterly and eloquent address, in which he alluded to the marvelous natural resources of Indiana and the glory of the state as a commercial empire, its high achievements in art, in education and the prominent industries. His speech was a splendid oratorical effort, and was thunderously applauded.

Responses to toasts were made by President Peter, Messrs. Marshall, who told the inimitable "ghost story," Graveson, Seward, Winstandley, McGee, McCormick and others, the crowd dispersing about two in the morning.

THE QUARRYMEN.

IMMEDIATELY on the adjournment of the Ohio Valley convention, Mr. Sylvester Marshall, president of the National Association of Quarry Owners, called together the quarrymen present for an informal discussion of questions affecting their personal interests. He reported on the work done by himself during the past year, in bringing to the attention of quarry owners the urgent need of a better understanding among them. He had communicated by letter or by circular with all whose names and addresses could be secured, but the responses had not been encouraging. While most quarrymen recognized that an organized body might be an effective agency in changing for the better many of the unfavorable conditions and customs of the trade as at present followed, he had received no advice as to the best plan to pursue, and he was present to receive an expression of opinion from quarrymen as to what was most desired, and upon what lines the proposed national association should be organized. He suggested that a committee of five be selected to draft plan of organization to submit at the convention to be held in Chicago, February 21, said committee to assemble in Chicago, one day prior to the date fixed for the convention. Mr. Winstandley moved that said committee comprise all gentlemen present, and that every one go prepared to give their views, or if impossible to be present, that they embody their views in a paper to be read at that time. Unanimous consent was given to this motion.

A general discussion of topics that should be of interest in the work of planning for the organization was indulged in, after which the meeting adjourned.

THE SOUTHERN OHIO ASSOCIATION.

THE Southern Ohio Quarry Owners' Association met in Portsmouth, O., on 9th inst. and completed the first year of their organization, extending mutual congratulations upon the splendid work of the year. We take the following report from the Portsmouth *Blade*:

Ex-Senator H. J. Cleveland, the agent of the World's Fair Commission of Ohio met with the stone men and talked the matter of the stone display

at the fair over with them. Ohio's display of stone at the fair will be unique. A beautiful building, of graceful architecture, but on a moderately small scale will be placed in the Mining building, and it will be a composite of all the fine building stone of the state. In this building Scioto county will have an important part, one of the corners, with eight pillars, base, entablatures, cornice, etc., will be constructed exclusively of Scioto and Pike county stone. The exhibit will comprise about \$500 worth of stone, in all the various and lovely shades furnished by the many stratum of fine stone in that region. The firms furnishing this material are the Buena Vista Freestone Company, I. Reitz & Co., C. C. Bode & Son, E. H. Wishon, J. M. Inskip, W. R. Smith & Sons, John Miller & Sons, R. R. Peebles & Co., and the Waverly Stone Company. The stone men discussed the matter thoroughly with Mr. Cleveland, and after assuring that gentleman that they would furnish the material with the greatest possible despatch, they proceeded to parcel out the various portions of their part of the structure among themselves. After they had made a division so nearly equal as they could, they found that about twenty dollars' worth of material "lapped" over. This the firm of Miller & Co. were instructed to furnish, four of the members chipping in five dollars apiece to recompense that firm. After

the matter of the fair exhibit had been arranged, and after it was decided to send all the material to Mr. I. Reitz, who was made the shipping clerk for the occasion, the members proceeded to the consideration of further business.



REITZ.

Mr. W. R. Smith, Jr., the secretary, reported the aggregate expenses of the year to have been \$81.27. He offered to read a detailed account and produce vouchers for his expenditure, but the members preferred to take his word for it and dispense with the details. There was \$23.30 in the treasury and a committee consisting of Mr. Wishon and Mr. Bode were appointed a committee to see that none of it had gotten away.

The report of the secretary was received and adopted, and subsequently Treasurer Miller made his report which coincided with the secretary's in every particular, which was also adopted. Following this the retiring officers gave expression to their sentiments on retiring. Mr. Adolph Caden, the president, said that he looked back with pleasure on the work of the organization. A year ago some of the members would scarcely speak to each other when they met, now they were able to meet together and discuss matters of mutual interest like rational beings. Much had been done toward the advancement of the interests of the members in the past year and much more would surely be done in the



MILLER.



SMITH.

future. Mr. Reitz, vice-president, heartily indorsed Mr. Caden's remarks.

Mr. Wishon referred to the sentiment common to the coin of the realm: "United we stand, divided we fall," and said that if they wanted to stand they had better unite, but if it was a tumble they desired to take, why divide by all means. Mr. Miller intimated that he might say much if he wanted to, but he restrained his remarks to the expression of a hope that the society might return to the old prices and maintain them.

Mr. W. R. Smith made some quite eloquent remarks. He has heart and soul in the work, and it is to his good offices as a faithful secretary that the organization owes its success as much as to anything. Mr. Smith said that the only fault he had to find with the members was that they did not kick enough. He had wished to hear more from them and to be frequently stirred up in an epistolary way to the sense of his duties. He painted the future of the stone industry in Southern Ohio in glowing colors, and thought that their organization was just the thing to help it along.



CADEN.

After this abundant felicitation, the election of officers was taken up. The announcement of this order did not precipitate any unseemly struggle for place. A committee consisting of Messrs. Peebles, Wishon and Sturm were appointed to select a ticket, and with little deliberation reported the following which was chosen without question: President, I. Reitz; vice-president, L. E. Sturm; secretary, W. R. Smith, Jr.; and treasurer, Chas. Bode, Sr. The new president at once took his seat and appointed as an executive committee Messrs. Peebles, Caden and Wishon. There being no other business to transact, the meeting adjourned to meet sometime the first of March.

The following members of the association were present: A. Caden, Buena Vista Freestone Company; L. E. Sturm, Waverly Stone Company; I. Reitz & Albert Reitz, I. Reitz & Co.; C. C. Bode, C. C. Bode & Son; E. H. Wishon, J. M. Inskip, W. R. Smith, of W. R. Smith & Sons; and John Miller, of John Miller & Sons; and R. R. Peebles, of Peebles & Co.

ALLEGHENY COUNTY ASSOCIATION.

THE regular annual meeting of the Cut-Stone Contractors' and Quarrymen's Association of Allegheny County, was held at the Hotel Duquesne, Pittsburgh, February 14. In point of attendance and general interest it excelled any previous meeting held by this successful organization. The following officers were elected for the ensuing year: President,

E. A. Knox; vice-president, Wm. Rolf; secretary, C. F. Buente; treasurer, John Clark. Executive committee:—contractors—David Morrison, C. Jordan. Executive committee:—quarrymen—L. P. Haldeman, C. H. Stewart, Reese Lindsay.

In the evening a banquet of 150 covers was given at the hotel. A string orchestra, male quartet and a number of excellent toasts enlivened the occasion. The following day a visit was made to the Carnegie Steel Works and an informal supper tendered the contractors by the quarry owners present. In the evening the latter became the guests of the contractors, attending the performance of Roland Reed at the Alvin Theatre. A full report of the proceedings of the convention, with portraits of the officers and a full page illustration of the banquet, will be given in next issue of *STONE*.

THE DETROIT ASSOCIATION.

THE regular annual meeting of the Cut-Stone Contractors' and Quarrymen's Association, of Detroit, was held Tuesday, February 7, at the headquarters of the association, room 10, Kanter block, Detroit, Mich. President James Young called the meeting to order and Secretary Bebee called the roll, which was responded to by the following:

Quarry Owners: Cleveland Stone Co., Cleveland, O.; Malone Stone Co., Cleveland, O.; Elyria Stone Co., Elyria, O.; Grafton Stone Co., Grafton, O.; Forest City Stone Co., Cleveland, O.; Fuerst, Neu & Co., Chicago, Ill.; Ashland Brownstone Co., Chicago, Ill.; Prentice Brownstone Co., Ashland, Wis.; G. A. Baillie, Berlin Heights, O.; Maxwell & R. If, Cleveland, O.; The Ohio Stone Co., Cleveland, O.; Detroit & Hocking Valley R. & B. Stone Co., Detroit, Mich.; Detroit Brownstone Co., Bedford Stone Quarries Co., Buckeye Stone Co.

Contractors: Robertson & McDonald, Batchelder & Read, Jas. C. Cobb, Piggins & McIntosh, Smith & McDonald, Victor Campros, Jas. M. Young, H. A. Beebe & Co., Ortman & Groat, Klein & Ochlenbach, Finkheiner & May.



W. S. PIGGINS.

The minutes of the previous meeting were read and approved, as were also those of the meeting of the executive committee. Treasurer Read reported as to the financial condition of the association, showing a healthy condition; all dues, fees and fines having been duly settled. On motion the fines for non-attendance at the semi-annual meeting were emitted, as was also that of the Cleveland Stone Company, for furnishing stone to contractors outside the association, owing to lack of evidence against them. Mr. Read and Mr. Alexander Arnold related the circumstances attending the transaction and showed wherein the company was not at fault. It having come to the notice of the association that the Michigan Stone Company was about to discontinue business it was dropped from the list of members.

The secretary read his report, showing the association's affairs to be in a flourishing condition, and the same was approved. A recess of ten minutes

was had in which to nominate officers. The following names were placed in nomination: President, W. S. Piggins, James Young; vice-president, Mr. Read, Rob't. Robertson, Wm. Rolf; secretary, H. A. Bebee, John Smith; treasurer, Mr. Read. Mr. Young positively declined to serve and his name



JOHN SMITH.

was withdrawn. The election resulted in the choice of the following: President, W. S. Piggins; vice-president, Rob't. Robertson; secretary, John Smith; treasurer, Mr. Read. Board of trustees: Messrs. Campross, Rolf, McCormick, Smallwood and W. E. Miller. A discussion was had relative to the secretary's salary, participated in by Messrs. McCormick, Young, Read, Rhoades and Secretary-elect Smith, who favored a reduction since the meetings now occurred twice a year instead of monthly, as originally intended. On motion, a committee was appointed to draft resolutions of regret at the withdrawal of

Mr. G. A. McArthur from the stone business. Messrs. W. E. Miller, Batchelder and Rolf were appointed and tendered the following:

WHEREAS, It has come to the knowledge of the members of the Cut-Stone Contractors' and Quarrymen's Association, of Detroit, Mich., that Mr. George A. McArthur, an active worker in the stone business, and an earnest co-laborer in upholding the principles of this organization, has resigned his position as assistant secretary of the Cleveland Stone Co., and contemplates retiring from the stone business, and

WHEREAS, We have long recognized in Mr. McArthur a gentleman of sterling worth, strict integrity, and honorable in his business methods, and an earnest co-worker in perfecting harmonious relations between our respective trades and allied interests, and

WHEREAS, Because of these estimable qualities in a business and social way, he has endeared himself to us individually and collectively, and we view with regret his withdrawal from the stone business, and from membership in this association, therefore be it

Resolved, That we, the members of the Cut-Stone Contractors' and Quarrymen's Association, in convention assembled, express our deep regret at the withdrawal of Mr. McArthur from our midst and tender him our best wishes for success in whatever field he may select, and be it further

Resolved, That a copy of these resolutions be spread on the minutes of the association, a copy, suitably engrossed, be mailed to Mr. McArthur, and that the same be published in *STONE*, the official organ of this association.

W. E. MILLER,
WM. ROLF,
J. L. BATCHELDER,
Committee.

Adopted by acclamation.

On motion of Mr. Grubbs, *STONE* was made the official organ of the association. Moved that a vote of thanks be tendered the retiring officers. Carried. Adjourned until 3 o'clock.

AFTERNOON SESSION.

Called to order at 3 o'clock. Mr. W. E. Miller requested that Mr. Rowley, representing *STONE*, read to the assembly a communication he had received from Sylvester Marshall relative to the support of the National Quarry Owners' Association. The communication was received with great favor and ordered spread on minutes of the association. A resolution was

introduced by promineut quarrymen present looking toward the establishment of a scale of prices to contractors, contemplating the support of the latter in its maintenance, but owing to a conflicting clause in the constitution and by-laws, on motion of Mr. McCormick, same was ordered placed on file to be acted upon at next annual meeting, notice of same being given the members thirty days in advance of the meeting. A discussion was had relative to the expenses of the summer outing of the association and a motion that they hereafter be limited to \$150 was voted down. Mr. C. O. Malone moved that the room occupied by the association at an expense of several hundreds of dollars per year for two months be given up. Carried. On motion it was decided to meet in semi-annual session at the "Flats," the first Tuesday of August. Mr. Young, the retiring president, announced a banquet for that evening at 8 o'clock, and invited all those present and their friends to be in attendance. Adjourned.



LEONARD READ.

THE MISSOURI VALLEY ASSOCIATION.

THE fifth annual meeting of the Missouri Valley Cut-Stone Contractors' and Quarrymen's Association will be held on Tuesday, March 7, 1893, at the Murray Hotel, corner Fourteenth and Harney streets, Omaha, Neb. Satisfactory arrangements have been made to accommodate members and their friends at this hotel which will be headquarters during the meeting.

W. E. Emery, Secretary.

A QUARRY HORROR.

THE worst disaster in the history of Vermont marble quarrying came the afternoon of 11th inst. when a mass of stone fell from overhead in a West Rutland quarry and instantly killed five men and injured ten others. The accident was in the famous Sheldon "covered quarry"—so-called from the fact that it has a wooden cover or roof—operated by the Vermont Marble Company, near the extremity of work, downward and eastward over 500 feet from the surface of the ground. The mass of rock fell upon one gang of men only. The quarry is just north of a big sawing mill of the Vermont Marble Company and was opened by Sheldon & Slauson in 1868 and operated by the Sheldons until January 1, 1892, when it was leased by the Vermont Marble Company, which has run it since. Depth and surface considered, it is the largest quarry in the world. Its perpendicular depth is over 250 feet, and from this the quarry runs eastward and downward under the hill 300 feet or more.

The section of stone which fell was sixty-five feet long, from sixteen to eighteen feet wide and varied in thickness from two to three feet. Daniel

O'Rourke, foreman of the gang of men at work in the quarry, estimates that it weighs 100 tons, while some estimate its weight as high as 150 tons. It fell about twelve feet. At the time the accident happened about eighty men were working in the quarry, though the most of them were in other parts of it. A track for the cars used in the removal of refuse matter was being laid across the bottom of the quarry, and but a short time before the accident five men who were at work under the stone which fell were put at work on the track. This fact doubtless saved several lives. Many theories are advanced as to the cause of the accident. Daniel O'Rourke, foreman of the quarry, when interviewed in regard to the disaster, said in substance: "There were about eighty men at work in the quarry at the time of the accident. Sixteen men were at work in the tunnel where the accident occurred. This gang was cleaning away loose stone thrown out by a recent blast. Another gang of eight men was at work near by cleaning off scale. The company made a practice of removing scale, even if it were necessary to use blasts to do so. The quarry was considered the safest of any of the deep quarries. It was not known that the scale or top of the tunnel that fell was loose. The scale was about sixty-five feet long, sixteen feet wide, three feet thick on the front side and two feet thick on the back. The marble under the scale that fell had been quarried in a manner different from the usual one. Instead of blasting from the top and placing the machines in the space thus formed, the machines had bored horizontally into the marble and the blocks were broken off and removed. A tunnel about sixteen feet long and twelve feet high was made in this way. The machines then bored upward a little, and blocks thus cut were removed. This tunneling was done by the Sheldon Marble Company about three years ago. Since the Vermont Marble Company took charge the old system of blasting from the top has been used. There are loose beds between the layers of marble in this quarry, and I think the upward boring made the layer above the tunnel thin on the back side. The recent severe cold weather probably froze the water between the layers, and possibly the expansion loosened the scale."

In reply to a telegram from STONE as to the cause of the disaster, Mr. E. R. Morse, treasurer of the Vermont Marble Company, writes as follows:

"The scale which fell weighed something like 100 tons, and there was no indication whatever, of any break in the roof. It is true that there was some small scales yet to be picked out of the roof, but these were scales which occurred in tunneling in, and were all being removed as the tunnel was put in. These had nothing whatever to do with the accident. The quarry in question was always considered one of the safest on the line, and although at a considerable depth, there has never been a serious fall from the roof. The accident of Saturday was the most serious, fatally, that has ever occurred."

This is corroborated by Superintendent Robinson and a number of the operators. The exact cause of the displacement of the mass of stone will probably never be known but it is believed the theory of Mr. O'Rourke above given is the most likely to account for it.

EDITORIAL COMMENT.

STONE will pay \$25 for the best article giving plans and elevations, and methods of cutting stone for an arch in a circular wall. This is an interesting study. Article should be accompanied by drawings to scale and written in simple language.

We shall from time to time offer premiums for other problems in practical work.

REPORTS of the numerous conventions take up a large portion of the space of this issue, and several features are crowded out of their regular course. This is the season when trade matters are uppermost in the minds of stone men, and the proceedings of the meetings are most interesting to them, hence we have no apology for using so much of our space for complete reports of them.

WE have nothing definite to report at date of this writing concerning the investigation set on foot at Washington in the matter of the lettings for the marbles for the new congressional library building. Our letters indicate that the specifications of the architect which calls for so much of the foreign product will be changed in favor of the domestic product, if not entirely at least to a fair measure of it.

WE invite the attention of our readers to the report of the meeting of producers in Tennessee, on page 191 of this issue. If anybody is unacquainted with the quality of righteous indignation which can be emitted by true Americans, when they are aroused, the speeches and letters therein reported will give him an access of information that may be wholesomely enjoyed. We hope this remonstrance will stand as a precedent of the dominant de-

sire of the people of this country, often expressed, that government buildings and works shall be of American construction out and out, and a declaration that of all places these must be excepted, wherein no foreign product, in competition with native, shall be permitted to enter. This much is deferent to the rights of our producers and manufacturers, equally so with anything government should grant as a protective favor.

A QUITE pertinent question is that which was introduced by Mr. Marshall in his address before the Ohio Valley Association: Why should the quarryman pay the freight? We may answer for the stone trade—he should not. It would not make the difference of a dollar to the honorable contractor or dealer, if the rule were universal that shipment of stone should be f. o. b. cars at quarry, for the dealer or contractor could get the freight in his estimates and be secure. But the quarryman dealing with the railroads that formulate bills of lading under all degrees of classification and rules of deduction that are past all understanding, takes all the risk, and must settle at both ends of the route—with the fellow who figures up the weight and freight and doesn't care a snap if it is correct or not, and with the purchaser who claims rebate for which the road is primarily responsible. The man at the receiving end is there to check up on the bill of lading but the quarryman at the forwarding end must pay the railroad and take the chances of what he has sent reaching destination full weight and in proper condition. While the present system of

the railroads to calculate their charges on their own weighing is in vogue the quarryman who sells his product by cubic measurement is left without recourse. The simple correction for all this is, as Mr. Marshall says, to quote prices less the freight, f. o. b. at the quarry, and let the consignee do the watching, with his bill of lading and quarryman's receipts in hand, beside the scales at his end. Add to this the abolition of the antiquated rule of "yard, perch and pole" in measuring stone, and let it be sold by the pound, and two of the worst evils that afflict the business may be done away with. It is to provide a remedy for such evils as these that the quarrymen will meet in Chicago on the 21st inst. Every honorable contractor will indorse their efforts to bring about such a reform in methods of doing business.

THE monumental trade seems beset with the same evils that afflict the greater industry, the cut-stone business—that of price-cutting and the irresponsible dealer. There is only one way to get rid of these evils, and that is through organization, which involves as its first principle mutual obligation. We can point to no better, more feasible, or more perfect plan through which organization can be made effective than that which binds the common interests of the working-men in trades unions. Organization on purely sentimental grounds is to be commended, in a sense, but if the bank accounts of individuals are menaced by irregular action of competitors, the force of a penalty as a binding rule of membership is necessary. The best of men will violate the laws of an organization that provides no check to competition, and will do so fairly enough in respect to motive. If the rule were enforced that for the protection of one and all, the individual shall forego an

advantage which circumstances have brought him, no one could say but it were a righteous one. "Put yourself in his place" is worthy of observance as a golden rule, in the present order of doing business. In the mad rush of money-making, as we observe it nowadays, no man can surely calculate on what to-morrow will bring forth as a new revelation of his competitor's methods. It would seem essential, therefore, that a mutual understanding as to the methods of doing business should be established by those engaged in the separate lines of trade; that each should have a fair chance to succeed, backed by the collective power of an organization that could punish infractions of its laws. That would be the exemplification of the common law under which all men are expected to bow in submission. It would be wise, expedient and forceful.

THE first chapter of a series of articles that will be especially interesting to those of our readers who are architects or builders is presented in this issue—"The Chateaux of France." A chateau is defined as a fortified residence, and in France during the period when most of them were erected, the country was an aggregation of baronetcies at war with each other, which made it essential that possessions of estates should be defended in a military manner, hence these castellated structures were built of the very strongest material available, almost entirely of stone. The architectural details of these are remarkable examples of superb conception and skillful workmanship. The opening chapter is historical, leading properly to the description of details in succeeding chapters. These notable buildings have never to our knowledge been described in English print, and will no doubt be highly entertaining and profitable to our readers.

THE NEW UNIFORM CONTRACT.

[Form of Contract adopted and recommended for general use by the American Institute of Architects and the National Association of Builders.]

THIS AGREEMENT, made the.....day of
.....in the year one thousand eight
hundred and ninety.....by and between
.....
.....party of the first part
(hereinafter designated the Contractor), and
.....
.....party of the second part
(hereinafter designated the Owner),

WITNESSETH, That the Contractor, in consideration of the fulfillment of the agreements herein made by the Owner, agrees with the said Owner, as follows:

Article 1. The Contractor, under the direction and to the satisfaction of.....Architects, acting for the purposes of this contract as agents of the said Owner, shall and will provide all the materials and perform all the work mentioned in the specifications and shown on the drawings prepared by the said Architects for the.....
.....
.....which drawings and specifications are identified by the signatures of the parties hereto.

Article 2. The Architects shall furnish to the Contractor such further drawings or explanations as may be necessary to detail and illustrate the work to be done, and the Contractor shall conform to the same as part of this contract so far as they may be consistent with the original drawings and specifications referred to and identified, as provided in Art. 1.

It is mutually understood and agreed that all drawings and specifications are and remain the property of the Architects.

Article 3. No alterations shall be made in the work shown or described by the drawings and specifications, except upon a written order of the Architects, and when so made the value of the work added or omitted shall be computed by the Architects, and the amount so ascertained shall be added to or deducted from the contract price. In the case of dissent from such award by either party hereto, the valuation of the work added or omitted shall be referred to three (3) disinterested arbitrators, one to be appointed by each of the parties to this contract, and the third by the two thus chosen; the decision of any two of whom shall be final and binding, and each of the parties hereto shall pay one-half of the expenses of such reference.

Article 4. The Contractor shall provide sufficient, safe and proper facilities at all times for the inspection of the work by the Architects or their authorized representatives. He shall, within twenty-four hours after receiving written notice from the Architects to that effect, proceed to remove from the grounds or buildings all materials condemned by them, whether worked or unworked, and to take down all portions of the work which the Architects shall by like written notice condemn as unsound or improper, or as in any way failing to conform to the drawings and specifications.

Article 5. Should the Contractor at any time refuse or neglect to supply a sufficiency of properly skilled workmen, or of materials of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, or fail in the performance of any of the agreements herein contained, such refusal, neglect or failure being certified by the Architects, the Owner shall be at liberty, after.....days' written notice to the Contractor, to provide any such labor or materials, and to deduct the cost thereof from any money then due or thereafter to become due to the Contractor under this contract; and if the Architects shall certify that such refusal, neglect or failure is sufficient ground for such action, the Owner shall also be at liberty to terminate the employment of the Contractor for the said work and to enter upon the premises and take possession, for the purpose of completing the work comprehended under this contract, of all materials, tools and appliances thereon, and to employ any other person or persons to finish the work, and to provide the materials therefor; and in case of such discontinuance of the employment of the Contractor, he shall not be entitled to receive any further payment under this contract until the said work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this contract shall exceed the expense incurred by the Owner in finishing the work, such excess shall be paid by the Owner to the Contractor, but if such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, either for furnishing materials or for finishing the work, and any damage incurred through such default, shall be audited and certified by

G—Stone.

the Architects, whose certificate thereof shall be conclusive upon the parties.

Article 6. The Contractor shall complete the several portions, and the whole of the work comprehended in this Agreement by and at the time or times hereinafter stated..... provided that.....

Article 7. Should the Contractor be obstructed or delayed in the prosecution or completion of his work by the act, neglect, delay or default of the Owner, or the Architects, or of any other contractor employed by the Owner upon the work, or by any damage which may happen by fire, lightning, earthquake or cyclone, or by the abandonment of the work by the employes through no default of the Contractor, then the time herein fixed for the completion of the work shall be extended for a period equivalent to the time lost by reason of any or all of the causes aforesaid; but no such allowance shall be made unless a claim therefor is presented in writing to the Architects within twenty-four hours of the occurrence of such delay. The duration of such extension shall be certified to by the Architects, but appeal from their decision may be made to arbitration, as provided in Art. 3 of this contract.

Article 8. The owner agrees to provide all labor and materials not included in this contract in such manner as not to delay the material progress of the work, and in the event of failure so to do, thereby causing loss to the Contractor, agrees that he will reimburse the Contractor for such loss; and the Contractor agrees that if he shall delay the material progress of the work so as to cause any damage for which the Owner shall become liable (as above stated), then he shall make good to the Owner any such damage. The amount of such loss or damage to either party hereto shall, in every case, be fixed and determined by the Architects or by arbitration, as provided in Art. 3 of this contract.

Article 9. It is hereby mutually agreed between the parties hereto that the sum to be paid by the Owner to the Contractor for said work and materials shall be \$..... subject to additions and deductions as hereinbefore provided, and that such sum shall be paid in current funds by the Owner to the Con-

tractor in installments, as follows:

The final payment shall be made within..... days after this contract is fulfilled.

All payments shall be made upon written certificates of the Architects to the effect that such payments have become due.

If at any time there shall be evidence of any lien or claim for which, if established, the Owner or the said premises might become liable, and which is chargeable to the Contractor, the Owner shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify him against such lien or claim. Should there prove to be any such claim after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging any lien on said premises made obligatory in consequence of the Contractor's default.

Article 10. It is further mutually agreed between the parties hereto that no certificate given or payment made under this contract, except the final certificate or final payment, shall be conclusive evidence of the performance of this contract, either wholly or in part, and that no payment shall be construed to be an acceptance of defective work or improper materials.

Article 11. The Owner shall, during the progress of the work, maintain full insurance on said work, in his own name and in the name of the Contractor, against loss or damage by fire. The policies shall cover all work incorporated in the building, and all materials for the same in or about the premises, and shall be made payable to the parties hereto, as their interest may appear.....

Article 12. The said parties for themselves, their heirs, executors, administrators and assigns, do hereby agree to the full performance of the covenants herein contained.

IN WITNESS WHEREOF, The parties to these presents have hereunto set their hands and seals, the day and year first above written.

In presence of

..... [SEAL]
..... [SEAL]
..... [SEAL]
..... [SEAL]

Copies of this contract may be obtained of the Inland Publishing Co., of Chicago, at the following prices, post-paid: 100 copies, \$1.10; 500 copies, \$4.25; 1,000 copies, \$8.00.

THE ENGINE ROOM.

Generally, the first thing an engineer will do, in the case of a hot journal, if he has water handy, will be to attempt to cool it off by a copious supply of that liquid, but that it is a bad practice has been repeatedly shown on railway machinery, vessels and in stationary plants. A contemporary tells of a case where the journal of the main shaft of a coasting steamer became heated and water was applied for cooling it. After the trip was finished, an examination of the journal disclosed the fact that it was cracked, both longitudinally and transversely and that some of these cracks extended through the shaft, which was fourteen inches in diameter, a crack in one place being twenty-two inches long, coming to within two inches of the outside. It is frequently the case that the axles of cars which have become heated and have been cooled with water, break off with a clear fracture shortly afterward, showing that the nature of the metal has been greatly changed, and in some cases when a break has occurred, old cracks have been shown which must have been made at the time the journal was cooled. Occasionally we hear of the crank-pin of a stationary engine breaking off near the disk or crank and without apparent cause, other than it had been cracked for some time, as shown by the fracture, or that the metal had become crystallized. A careful investigation of such cases will usually show that the pin has, at some previous time, been quite warm and that water was used to cool it.—*Boston Journal of Commerce*.

The brick work about boiler settings is, we fear, often very imperfectly laid. It is mostly done by contract, with no one to supervise it who understands the severe use to which it is to be put. The bricklayer, who may never have worked on a job of this kind before, builds good looking inside and outside walls, but the space between is apt to be filled with odds and ends in the most promiscuous manner. Furthermore, he puts the same joint in that he would use if he were building a house, and this is just what we do not want in a boiler setting, particularly in the fire-brick lining of the furnace. The joints throughout the setting should be thin, and the work should be done as faithfully inside as out. Some sort of prepared fire-clay is used in laying the fire-brick, and it should be mixed up so thin that it cannot well

be used with a trowel. Some mill owners who may have had experience in this direction will not allow a trowel to be employed at all, but require the men to use iron spoons. The fire-bricks should be dipped in water as they are used, so that when they are laid they will not immediately "drink up" the water from the cement. They should then receive a thin coating of the prepared fire-clay or kaolin paste, and be carefully placed in position with as little of the kaolin or fire-clay as possible. Every sixth course, beginning with the grates, should be a row of headers, well bonded into the masonry behind. The headers are of little use unless they are well secured into the walls of the setting, for when the lower courses of fire-brick have burst away more or less, we have to rely on these headers to a considerable extent to hold the upper part of the wall in position. In preparing fire-brick linings, the lower courses, which burn out fastest, can be removed and replaced without disturbing the upper part of the wall; provided the headers are secure, while if they are not, the entire wall may have to be rebuilt, and this cannot be done without either removing the boiler or tearing down a considerable part of the setting.—*Machinery*.

I had a fireman who wasn't afraid of boilers; he knew all about boilers and would laugh at our fear of high steam. One day I was running the saw above—it was a 60" saw, and I had on a big white oak log, and the saw ran right through without slacking the motion. This was unusual, as the engine was too small for the saw, and fearing the steam was too high I went below and found our engineer had put on a heavy fire, hung the big hoe, weighing about sixty pounds, which we had for cleaning the flues, on the safety valve, and was playing seven-up with some visitors. I commenced to scold, but he laughed at my fears and gave me to understand that he knew all about boilers. I had to discharge him and hire a man that was afraid of boilers. It is not the incompetent men who cause boiler explosions; it is carelessness, lack of fear, lack of inspection and proper repairs. A new man at the firing is usually nervous and very careful to keep plenty of water. A good boiler, properly cleaned, with plenty of water in it, is never dangerous unless the water foams, when the engine should shut down at once, part of the water blown out from

the top, fresh water pumped in and more blown out until it stops foaming.—*Ohio Valley Manufacturer.*

On an engine, lately, trouble was experienced with the crank pin heating and melting out some of the babbitt. The trouble was evidently a lack of oil. The oil cup for the crank pin was suspended from an arm that projected from a standard secured to the engine frame. The arm was held in place by the grip of a thumb-screw. This thumb-screw became loosened and allowed the arm to slip backward so that the oil instead of dropping into the crank-pin cup dropped down beside it. The heating of the bearing was the first intimation that this thumb set-screw was loose. A little mishap the loosening of this set-screw, yet it was the cause of a great deal of trouble. We have in mind another place where a crank pin heated, lately, and caused considerable trouble, and this case, also, we are told, was due to the failure of the lubricator to lubricate. We were not so much surprised here, for the engineer has been boasting that his crank-pin boxes are keyed up so tight that they will sustain the weight of the connecting rod horizontal. It is possible to have a bearing free from play and yet not so tight as that.—*Boston Jour. of Com.*

In his most recent work on the steam engine Professor Thurston says that the principles that must govern the engineer in his attempt to select the most efficient type of engine are as follows: (1.) The greatest practical range of commercially economical expansive working of steam. The fluid must enter the cylinder at the highest admissible pressure, and must be expanded down to the minimum economical pressure at exhaust. (2.) The wastes of heat must be made a minimum. All loss of heat by conduction and radiation from the engine must be prevented, if possible, and the usually much more serious waste which occurs within the engine, by transfer of heat from the steam side to the exhaust, by "cylinder-condensation" and re-evaporation, without doing its proportion of work, must be checked as completely as is practicable. This latter condition as well as commercial considerations, limits the degree of expansion allowable. It also dictates high speed of engine. (3.) The largest amount of work must be done by the engine that it can perform, with due regard to the preceding conditions. This condition compels us to drive the engine up to the highest safe speed and to adopt the highest practicable mean steam pressure.

Some changes were to be made in an engine room which would require more than double the weight to be placed on a floor above the engines. This floor or platform was supported on iron columns. After the plans and specifications for the additional machines had been made the engineer thought it would be well to go slow until they knew whether the supporting columns would have sufficient strength to hold the extra weight. The architect said that he would look into it. The result was that the specifications were changed to read so that four other iron columns of the same size were to be added to carry the increased weight. It stands an engineer in hand to keep his eyes and ears open and to know a little something when other people are going to make changes about his engine room; for had the machinery been added, as at first contemplated, the platform would probably have fallen with serious injury to the machinery and a strong likelihood that the engineer or some one else would have been caught in the wreck. A correspondent in another column calls attention to a number of points which, if followed out, would have been quite expensive on account of making more work and requiring additional tools, which would have been expensive and no greater economy would have resulted. Engineers who can protect their employer's interests in such ways are of much greater value than as though they had less knowledge of the general requirements or less time to observe what was being done about the plant.—*Stationary Engineer.*

"There is one thing a great many engineers do not seem to understand," remarked an engineer to us recently, "and that is that a great deal of steam will leak in a short time through a very small opening, at the pressures usually carried in steam engines to-day. The only proper way to test for leakage is to test running. A man may let on steam with the engine blocked on the center and hold a candle around his piston, and yet that piston leak considerable steam when the engine is running. In my experience I find more losses from leaky valves and pistons than from any other one source, and find it too, when men think everything is tight. It stands to reason that a piston or valve working 130 times a minute, day in and day out, and year after year, will wear on the bottom, and as it does not wear perfectly round leakage is sure to follow. This is a place that every engineer can make a saving if he goes about it."—*Boston Journal of Commerce.*

MONUMENTAL NOTES.

A bill is before the New York legislature for the appropriation of \$20,000 for the purchase of Polopel's Island and the erection thereon of a monument to Hendrick Hudson.

The Park Commissioners at Atlanta, Ga., have inaugurated a movement for the erection of a monument in Grant Park, to the memory of Col. L. P. Grant, who gave the park property to the city. It is suggested that a fund be raised to erect a memorial to cost not less than \$25,000, the monument to be placed on the most prominent eminence in the park.

The monument which the ex-Confederates will erect in Richmond, to the memory of Jefferson Davis, will not stand where his remains will be laid next spring. The grave is to be in a cemetery near the James river, in the north-western part of the city. The monument will be placed in Monroe Park, a quarter of a mile from this spot.

A fine monument for the late Alvar Akers is being made at C. Keim's marble yard at Johnstown, Pa. It will be erected over his grave in the Geistown cemetery.

The firm of Blethen, Curry & Co. of Lynn, Mass., has commenced work on the granite work of a fine cemetery lot for Richard Nagle, manager of the C. A. Shoe Company. The material is to be of Rockport granite from an original design, and will be erected in St. Joseph's cemetery, and when completed will be one of the finest in the grounds.

C. B. Canfield, of the New England Monument Company, New York, has been engaged by the Iowa Soldiers' Monument Commission, to prepare scale drawings for the monument from the accepted design. The sculptor, it will be remembered, died shortly after her design had been accepted and before all of the necessary detail drawings had been made. When Mr. Canfield has completed his drawings, proposals will be called for the construction of the monument.

The Maine legislature has passed an act to authorize the town of Abbott to raise and appropriate money for a soldiers' monument.

The Cayuga county board of supervisors have decided to postpone action on the proposed appropriation of \$10,000 for a soldiers' monument at Auburn, N. Y., until next fall.

Dr. A. S. Salley, of Orangeburg, S. C., has started a fund to erect a monument to Gen. David F. Jamison, who was a prominent Carolinian and president of the memorable secession convention. Several contributions have already been received.

The board of supervisors at Rochester, N. Y., have appointed a committee of three to advertise for the best headstone that can be furnished for the sum of \$15, for the erection of headstones for honorably discharged soldiers, sailors and marines for the coming year.

O. E. Clay, traveling agent for the Excelsior Granite Company, Montpelier, Vt., closed a contract recently for a monument to be erected over the grave of the late Hon. Hiram A. Cutting at Lunenburg, and another for Alden Stevens of Bradford. The latter is to be an elaborate and costly structure.

Silas A. Furguson, and others of the family, have just erected in Glenwood cemetery at Madison, N. Y., a splendid portrait monument to the memory of the late A. B. Furguson, for many years a respected resident of that village. The monument was procured of Dauley & Wright, of Oneonta, and is manufactured from the best Westerly, R. I., granite. It is of hexagon shape, seven feet at the base, containing seven pieces of polished and unpolished blue granite. The thirteen foot pedestal is surmounted by an artistic and elegantly wrought white granite statue seven feet in height. The monument cost about \$5,000, and the work has been executed in compliance with the wishes of the deceased as expressed in his will.

Mr. H. S. Decker of Auburn, Me., has commenced work on the tomb in Mount Auburn cemetery. It is to be built throughout of granite. At the rear there will be a granite tablet nine feet high by four in width. The tomb is being built for Mr. J. Merrill of New York City. It will cost about \$3,000.

FOR SALE, WANTED, ETC.

WANTED—Position as manager or foreman of cut-stone yard; have had experience in both hard and soft stone. Am successful in handling men, and can give any required reference. Address J. M. FISH, 33 W. Columbia St., Springfield, Ohio.

SALESMAN WANTED—An experienced traveling salesman wanted for a wholesale marble house. Address, giving experience and terms, "Marble," care of STONE, Indianapolis.

WANTED, SALESMAN—Experienced salesman, familiar with the marble trade, to introduce Rose Garnet. Must be a pushing man and acquainted with architects, etc. Rose garnet is a new stone for interior decoration; beautiful, unique, and destined to be a rival of the best grades of marble. Address, AMERICAN ROSE GARNET CO., 64 East 12th St., New York.

WANTED—Fine design of monuments and statuary to make for retail trade. R. A. CURTIS, 14 Cyclorama Place, Indianapolis, Ind.

WANTED—Four first-class marble copers, three first-class rub-bed hands, and one first-class marble cutter who thoroughly understands plans. Address, EAST TENNESSEE STONE AND MARBLE CO., Knoxville, Tenn.

FOR SALE—A fine white lime stone quarry on easy terms; R. R. connections. For particulars address P. FRIEDRICH & SON, P. O. Box 12, Columbia, Monroe county, Ill.

SITUATION—I want position with a good firm as foreman and salesman; have had experience in mantel and building work. Address W. H. CONLEY, Charles City, Iowa.

SITUATION—With some good firm as draftsman-office manager or salesman to the trade. Am familiar with making drawings and estimating granite work. Good correspondent and bookkeeper; good references. Address DRAFTSMAN, care STONE.

FOR SALE—Sullivan Channelling Machine with boiler. Used one year. Will sell with rack, etc., complete for \$700. ROMONA OOLITIC STONE CO., Indianapolis, Ind.

FOR SALE—Double-drum hoisting engine; used only three months; good as new. Also, 600 feet of steel cable and well-rigged boom derrick, with patent head. Just the outfit for contractors and builders. Will sell singly or all together at two-thirds cost. A bargain. Address, WATSON, CRAIG & SUTHERLAND, Warren, O.

WANTED—No. 1 machine granite polisher; steady work. ALEX BEGGS & SON, Allegheny, Pa.

FOR SALE—About 500 yards of steel wire cable in perfect condition; has been used on our passenger elevator a short time. Will be sold very cheap to get it out of our way; make us an offer. PETTIS DRY GOODS CO., Indianapolis, Ind.

Why don't you try the **SCIENTIFIC POLISHING WHEEL**? There are no complaints from those who use them. It is a great improvement over the common wheel. Write to **GEORGE B. ECKHARDT**, No. 909 Bancroft street, Toledo, Ohio, and he will furnish you all the information desired.

Hawley's Patent Sand Feed

Is used by all the leading firms—saws faster and better than any other sand-feed. More gangs using our feed than any other. Easily kept in order. Over 50 gangs working satisfactorily, using either crushed steel or shot with our feed. Can give best of references.

Orders solicited.

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Father Van Holt of Denver, Col., has prepared an elaborate plan for a model burial place on the site of the present Riverside cemetery. Provision is made for 80,000 graves, none of which are to be raised or marked by stones above the level of the ground. Hedges and railings are also prohibited, it being proposed to give the property all the attributes of a beautiful park.

The local order of Woodmen of the World at Highland cemetery, Austin, Texas, unveiled a monument in memory of the late ex-Mayor John W. Robertson in the presence of about 300 people. The services were very impressive. Rev. Dr. R. K. Smoot was the orator of the occasion.

Efforts are being made at Oakland, Cal., to raise funds for the erection of a monument to the dead poet, Richard Realf.

Lee Confederate Camp of Richmond, Va., has started a movement for the erection of a monument to the late Gen. John R. Cooke.

The Oneida, N. Y. Historical Society is seeking to erect a suitable monument over the

grave at Danube of the revolutionary leader, Gen. Nicholas Herkimer.

An old burying ground at Haverstraw, N. Y. is being dug up by brick-makers. This burying ground was used years ago by the earlier settlers who came to Haverstraw to bury their dead, and some forefathers of residents living in Stony Point and Haverstraw are now lying there awaiting the pick and shovel and the clay cart to carry their bones to the machine to be ground into brick. Workmen who are digging there have come across bones and skulls, and shovel them up like so much dirt. Many of them are supposed to be the remains of Indians.

By a recent action of the legislature, the trustees of Pittsfield township, Lorain county, Ohio, has been authorized to erect a soldiers' monument at a cost of \$2,000.

The Ladies' Monument Association, of Mecosta county, Mich., have asked the people to contribute \$1,000, the amount needed to complete a \$3,000 soldiers' monument fund. The monument will be erected at Big Rapids.

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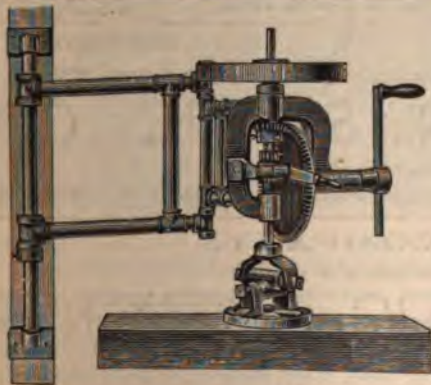
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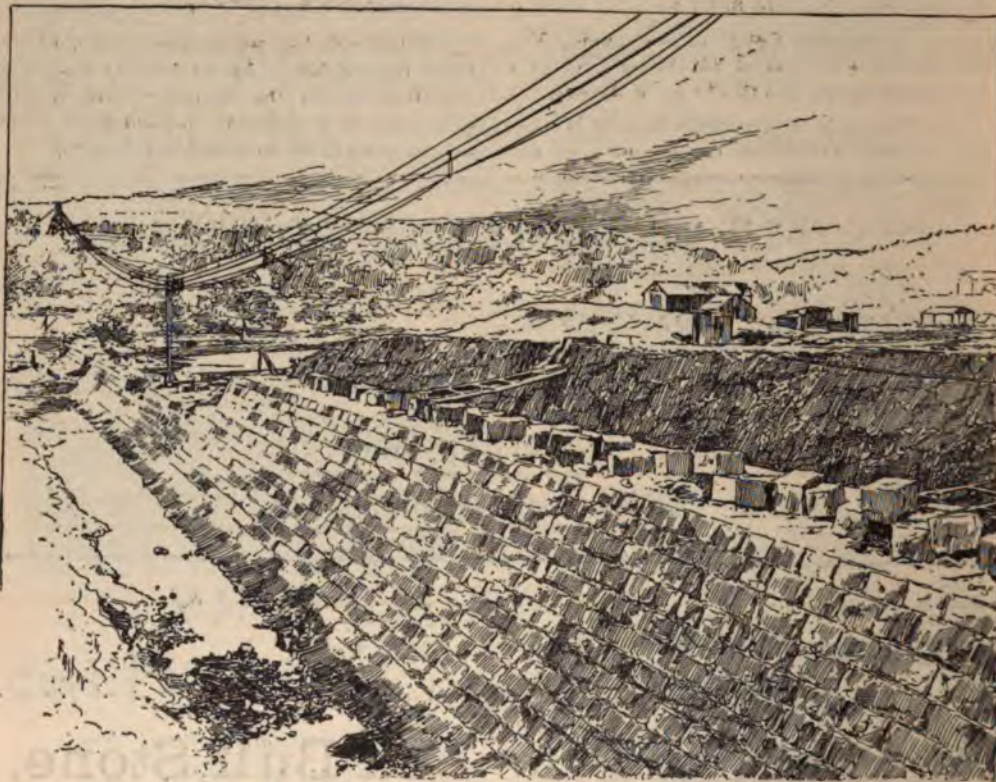
ADVERTISERS' DEPARTMENT.

THE LIDGERWOOD SUSPENSION CABLEWAY.

In a paper published in a recent issue of the *Engineering News*, prepared by Mr. E. W. Groves, engineer in charge of the construction of the Austin, Tex., dam, we find the following regarding the Lidgerwood Suspension Cableway as used in the construction of this famous structure: "Perhaps the most notable piece of machinery employed in the work is the overhead cableway, designed and furnished by the

to a height of sixty-five feet above the crest of the dam, while the east bluff rises ten feet above the dam. This cable is suspended on two towers; the easterly one in which is situated the hoisting engine, being seventy feet high, and the westerly one, thirty feet high. The main cable on which the carriage moves is two and one-half inches in diameter, 1,850 feet long and 1,350 feet between points of support.

"This is the greatest span of any hoisting cableway in existence.



Lidgerwood Manufacturing Company of New York, which, owing to its efficient work, demands more than passing notice. From the natural conformation of the ground, this was an ideal place for the location of this piece of machinery. The west bluff rises nearly vertical

"On the west side of the river, and 1,200 feet up stream from the dam, is situated a limestone quarry, from which extends a gravity railroad along the west bluff directly under the cable. A carload of rock could be run from the quarry to the cable, taken up at once and transported

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R. R. Shipping facilities unsurpassed.



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and Times Building in New York, also Cotton
Exchange Building in New Orleans, La.

Quarries in Dark Hollow.

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HALLOWELL
STONE
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of Bedford, Ind.

Stone Fronts, Cemetery Vaults, Large Platforms,

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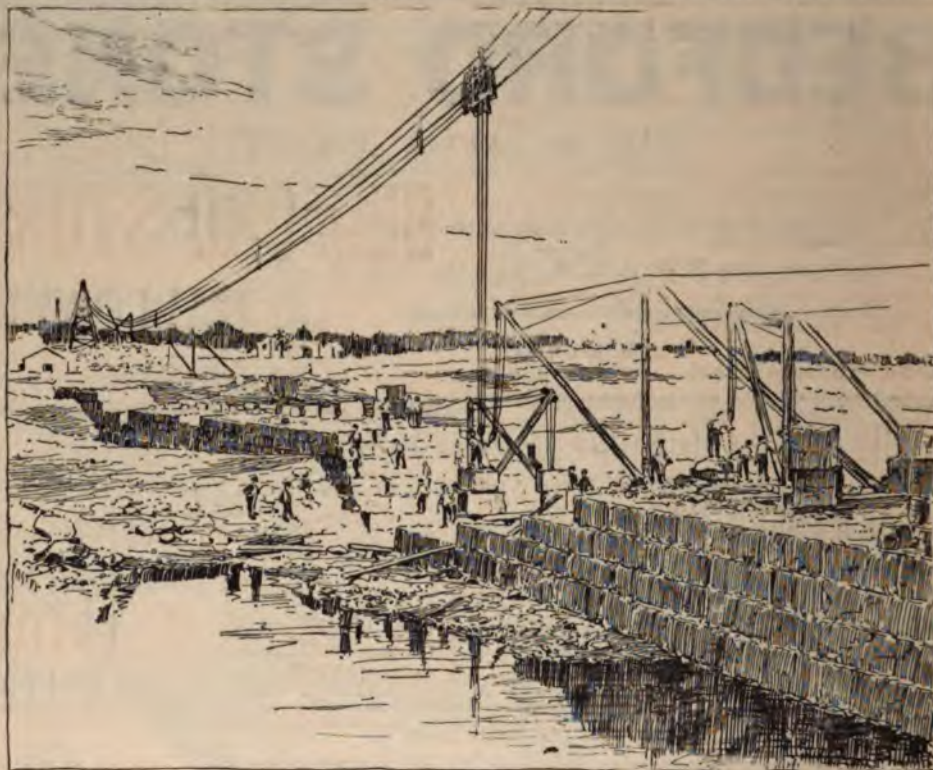
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[Established 1865.]

to derricks on any portion of the work. A double track was used near the dam so that an empty car was ready to receive the empty skip, and a loaded car was also ready when the carriage came for a load. This gravity railroad was submerged as soon as the dam was raised five feet above low water, and recourse is now had to barges, carrying twenty cubic yards of rock, which is brought to the side of the dam and there unloaded with a steam derrick. Under the cable at the easterly end of the dam extends the railroad bringing granite from the quarries,

adopted for handling the materials used in the construction of the dam, consisting of a cableway extending across the river over the site of the dam with the unprecedented span of 1,350 feet. We have in previous issues described in detail the cableway system of handling materials but it seems well to call attention to the fact that it has now had sufficiently wide use to fully prove its economy and convenience on works of this sort. Besides the Austin dam, the Sodom dam on the Croton water-shed was built by this method, and it is in use on the Butte City



which can be taken from the cars and transported to any portion of the work, in the same manner as the limestone. Mortar is mixed on the wall near the workmen, sand and cement being taken out by the cable. Loads of about five tons are usually carried. This cable is capable of supplying about 180 cubic yards of material per day, where the distance to be traveled is not more than 1,000 feet."

The *News* says editorially in the same issue, regarding the subject of Mr. Groves' remarks, "Probably the most notable feature of the work of construction is the method which was

dam, described in our issue of December 15. It has also been considerably used in constructing masonry arches.

"A great advantage of the cableway system is that when a plant is put in place it need not be moved or altered until the work is done. The frequent change of position required where an ordinary contractor's railway is used for moving material on such works increases largely the expense and time required.

"A second advantage of the cableway is found in the fact that it is entirely clear of the work itself and is safe from injury by flood or fire.

HOISTING MACHINERY,

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Engines,
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WALTER ARNOLD, Mgr.

Red and Gray Granite

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Cleveland, O., Oct. 1, 1889.

Messrs. Frenier & LeBlanc, Rutland, Vt.

Gentlemen: We are running 33 gangs with your sand feed, and see no reason to change our opinion as to the superiority of your machines. They will pay the entire expense of putting them in this season.

Yours truly, THE CLEVELAND STONE CO.

Write for Catalogue and Testimonials.

FRENIER & LeBLANC, Rutland, Vt.

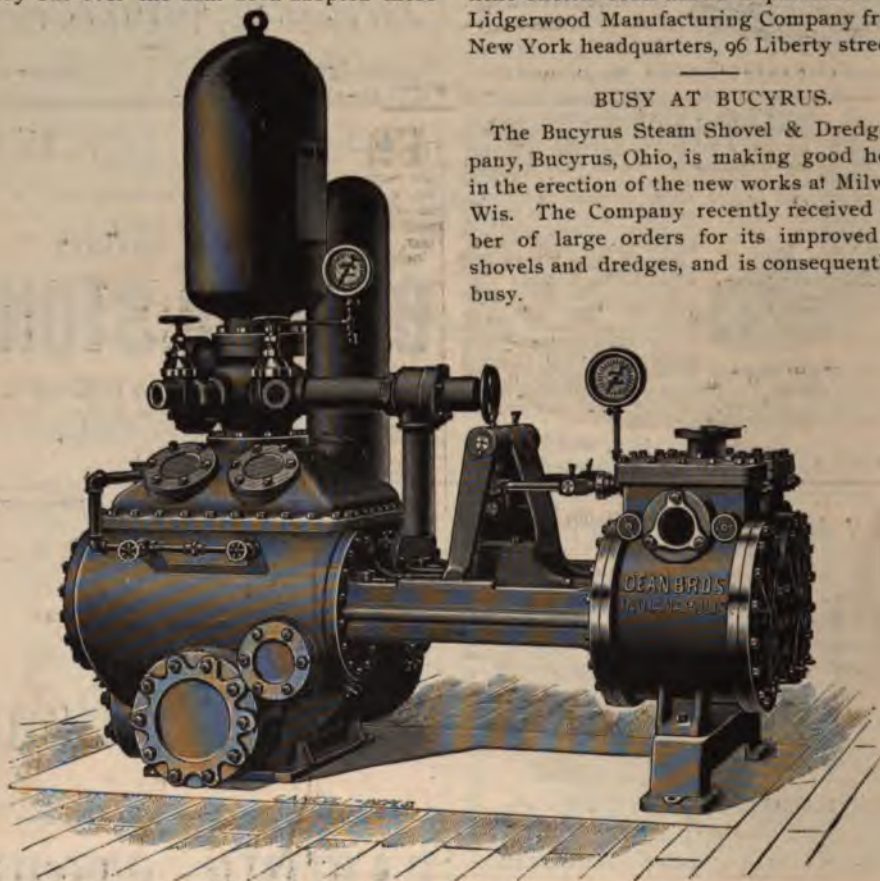
and reasonably safe from explosions on the work below. The importance of this has been fully shown at Austin. No less than eight different times during the past year has work on the dam been interrupted by high water, and at one time the water above the dam was forty-three and one-half feet above low water mark. Had the common plan of extending a railway out over the dam been adopted these

that presented by Mr. Groves cannot fail to be of great interest and value to contractors and others.

Our illustrations show two views of the big dam across the Colorado river, at different periods of its construction, with the Lidgerwood apparatus in operation. The Locke-Miller suspension cableway is fully illustrated in a dainty little sketch book which is published by the Lidgerwood Manufacturing Company from the New York headquarters, 96 Liberty street.

BUSY AT BUCYRUS.

The Bucyrus Steam Shovel & Dredge Company, Bucyrus, Ohio, is making good headway in the erection of the new works at Milwaukee, Wis. The Company recently received a number of large orders for its improved steam shovels and dredges, and is consequently very busy.



DEAN BRO.'S NEW FIRE PUMP.

delays would have been greatly lengthened by the time necessary to replace the portions of track and trestlework washed away at these floods."

This is indeed complimentary. Several times have we called the attention of our readers to the "Locke-Miller" or "Lidgerwood" cableway, manufactured by the Lidgerwood Manufacturing Company, and quoted the evident merit of the apparatus for hoisting and conveying purposes. Such direct testimony of its worth as

A NEW FIRE PUMP.

Dean Bro.'s Steam Pump Works, of Indianapolis, have recently brought out a new pump made from new patterns throughout, to conform to the demands of the Associated Insurance Companies for a Special Fire Pump for use in mills, factories and public buildings, where the premium on insurance risk is based upon the completeness of fire protection furnished by the insured.

These pumps are made in strict accordance

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Marble Work in the Country.

MARIETTA, - - - GEORGIA.

with the specifications adopted and required by committee on improved risks, representing the Associated Fire Insurance Companies, and the John R. Freeman specifications as required by the Associated Mutual Insurance Companies, and are constructed, inspected, and tested according to the true intention and meaning of these specifications.

Below we give a partial list of sizes and capacities of these pumps;

Number of standard 1½ fire streams each (250 gallons per minute).	Ratio of Areas Steam to Water Piston.	Nominal capacity, gallons per minute, full speed.	Diameter steam cylinder, inches.	Diameter water cylinder, inches.	Length of Stroke, inches.	Exact capacity Under- writers' rating, gal- lons per stroke.
1 stream	4 to 1	320	12	6	10	321
2 "	4 to 1	500	16	8	10	569
3 "	3 to 1	750	16	9¼	10	767
4 "	3 to 1	1000	18	10	12	1007

They are made of first-class material, and

finished and tested to a maximum pressure of 320 pounds to the square inch at the water end before leaving the works. They have bronze water-piston heads and followers, bronze removable liners in the water-cylinders, Tobin bronze piston rods and valve rods, bronze, or bronze lined stuffing boxes, cushioning valves in steam cylinders, a capacity plate, a stroke gauge, a steam pressure gauge, a water pressure gauge, a vacuum chamber, a water relief valve of large capacity, a set of brass priming pipes and valves, from two to four Chapman hose valves, and a sight feed lubricator. The water cylinders have three suction openings. They have large water valve area, large steam and exhaust passages, suction pipe connections and air chamber. The shells and boltings of these pumps are warranted extra strong. They are designed for stationary fire engines and are reliable, and can be operated at a high rate of piston speed without danger of breaking. A regulator is furnished with these pumps when required.

The manufacturers will be pleased to give any information in regard to these pumps, or any of the other lines of steam or power pumps made by them.

Send in your name for "Stone" for a year.

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xiii

SLATE



"WAR."

First Premium D-sign for Bronze Group of "War," on east side of Indiana State Soldiers' and Sailors' Monument; by E. Hündrieser, of Berlin, Germany.



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First premium Design for Bronze Group of "Peace," on west side of the Indiana State Soldiers' and Sailors' Monument; by Adrien Gaudre, of Neuilly, sur Seine, France.

STONE will hereafter be issued from Chicago. We will remove our entire plant to that city about the first proximo. We will have commodious offices in the Pontiac Building, northwest corner Dearborn and Harrison streets, in the very center of the publishers' district. Our removal is a business necessity. We have grown into metropolitan proportions, and we require easy access to every facility to meet the demands of such growth. We must also locate where we can be of greater service to our friends and patrons—where they go we must go—and all roads lead to Chicago this year.

We make a painful sacrifice in leaving Indianapolis. If there is a place on God's footstool where that which is pleasing in the busy actions of life; where personal comfort is an element to be considered; where an upright man finds faithful friends; where home has its blessed meaning—it is here. There is not a city in America that offers safer harbor to one who has passed the rapids. But our work, it may be said, has only begun. We must go where the hurly-burly is thickest, and make our fight for victory where the conflict rages fiercest. We are well armed, and, we believe, courageous. We will achieve success in large measure more quickly in Chicago than in Indianapolis. Hence the move.

Respectfully,

THE D. H. RANCK PUB. CO.



VOLUME VI.

MARCH, 1893.

NUMBER IV.

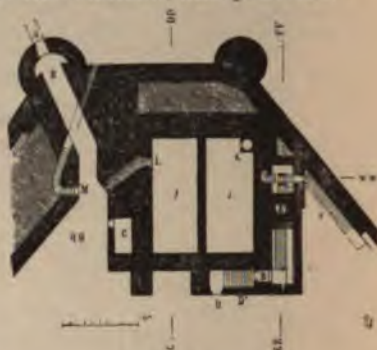
THE CHATEAUX OF FRANCE—II.

DURING all feudal time the donjon played a very important part in the defense of chateaux. It was the best fortified part thereof, the place of last retreat. While this was true as long as the fortified chateau existed, during the eleventh and twelfth centuries it was the only part of the chateau which was calculated for serious defense. It was here the baron and his men retired after the exterior defenses, which were relatively weak, had been taken. Feudal methods of warfare were peculiar to that time. Each baron was an independent lord, waging war against his neighbors. His troops were his vassals who owed him service only in time of war. This service was often limited in time; it was always limited in fidelity. The baron who could offer the most for the service of the vassal had the largest following. No baron could rely on his troops. They might betray him to the enemy or desert him at any time. In such a case, a refuge, where he and his men who remained faithful could retreat, was necessary. This was the donjon. Again, if the troops remained faithful, and the outer defenses were taken, a retreat was necessary where they could retire and fight to the last extremity. Here again was necessity for the donjon.

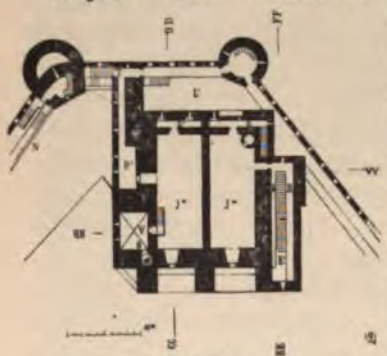
Reference to Fig. 1, in the article published last month, will show the first idea of the donjon at a time when the chateau consisted simply of earthenworks surrounded by palisades. There was the large wooden wall surrounded by the moat. Inside were the wooden sheds which served as lodgings for the dependents and troops. In the center was a large mound surrounded by a dry moat and surmounted by a wooden structure, the primitive donjon. This was the last defense. When chateaux began to be built of stone instead of wood the same general plan was at first employed,

the donjon being in the center of the inclosure or court. But this arrangement had grave defects. A garrison inclosed therein was forced to fight to the death, because to leave the donjon was to precipitate themselves into the midst of the enemy who filled the chateau court. Thus the donjon was placed near or connecting with the outer wall of the chateau, and provided with secret passages which opened into the moat, or had exit somewhere in the surrounding country. With such an arrangement, the garrison being forced to abandon their position, could leave secretly, and the besiegers find only an empty fortress.

There now remain the ruins of only a few of the early donjons. Along the coast of Normandy we find the remains of several which indicate that the structures of the early part of the eleventh century followed a given plan, being square. The best preserved of these early structures is the donjon of Arques, which was built in 1040. Fig. 4, in the article of last month shows the general plan of the chateau, and Fig. 5 is a bird's-eye view. It will be seen that the moat surrounding this chateau was dry, that the walls were of masonry, fairly well flanked by round towers which rise from the solid rock. There were two exits to this chateau: one at D, Fig. 4, and the other through the donjon at K. This chateau was built on a high escarpment which was almost impossible of access except on the side on which was built the donjon. Thus it will be seen that the donjon here, as in all well-



(Fig. 6.)



(Fig. 7.)

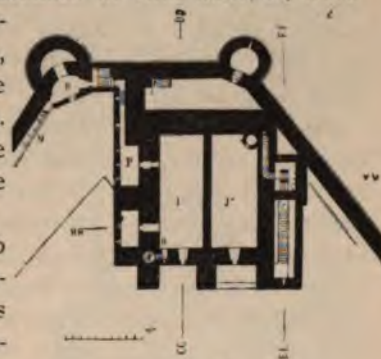
constructed chateaux, served two purposes: it being the best fortified of all the defenses of the place, was best calculated to protect the only readily accessible entrance; it also was the last resort of the baron in case the chateau was taken by the besiegers.

The ordinary means of attack of these fortified chateaux was scaling and mining. The only vulnerable points were the entrances, but, as will be described later, great precautions were taken to protect the entrances, and they were more rarely forced than would

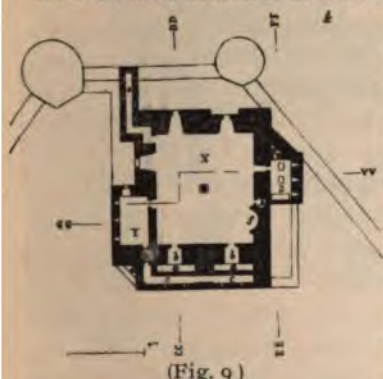
seem possible now that artillery is used. In fact, unless the besiegers succeeded in scaling the walls, or entering by breaches made by mining, such a chateau as that of Arques could only be reduced by famine. The donjon is shown at H in Fig. 4, and is as readily located in Fig. 5. Fig. 6 shows the ground floor of the donjon, B corresponding to K

in Fig. 4. The doorway at A, which passed under a tower, was protected by machicoulis and portcullis, and approached by a draw-bridge. The defenses accumulated about the doors of chateaux and donjons form an interesting study and will be considered in another article. It is sufficient to remember now that the defenses of this door, A, were wonderfully well arranged, both against surprise and assault. One entering the passage, B H, could not see what was passing in the courtyard because of the turn in the passage. This turn also offered advantages in case the besieged were obliged to defend the passage against the enemy.

We ask the close attention of the reader to the description which we give of the arrangements of this donjon, which was both curious and complicated, and therefore, difficult of description. It must be borne in mind that the donjon to every chateau was different in plan from that of all others; it being the idea of the builder to so arrange it that the enemy should not know how to best attack it and so that the besieged could defend himself to the



(Fig. 8.)



(Fig. 9)

best advantage. To this end only the baron and a few of his confidants knew the arrangements of the chateau. If a neighboring baron visited a chateau he only saw the outside of the donjon, being entertained in another part of the castle. Though he were a friend to-day he might be an enemy to-morrow, and must, therefore, not be intrusted with the arrangements for defense.

At C was a little post-room inclosed within the walls of the donjon, having no communication with the inside of the structure. The use of such a post is readily understood. In order to enter the donjon it was necessary to turn to the left and enter the door D. From there one ascended to the stairway E, which is a door cut through a pier, and turning to the left, ascended to the third floor by one long, steep flight, there being no opening from this stairway into the second floor. This stairway was wonderfully well defended. At the top, on a level with the landing, a walk was built on either side on which could be located a number of men who could throw stones on the besiegers and crush them. Again, several machicoulises open over this staircase from which a perfect rain of stones, powder, boiling oil and hot water could

B—Stone.

be thrown upon those ascending. The passage L, was cut in the fifteenth century. In earlier times the first floor was only reached by means of traps placed in the floor of the second story. M was a stairway which descended under the entrance passage communicating with a rapid descent into the fosse, and providing a secret means of retreat to the garrison. N will be mentioned later. It will be noticed that the rooms J and J' had no means of communication—reference to the cuts of the second and third stories will show a similar arrangement.

Fig. 7 is a plan of the second floor. It will be remembered that the staircase E E' did not communicate with this floor. The side J'' could only be reached by a trap door in the floor of the third story. The side J' could be reached in two ways: by going to the third floor and descending the winding staircase O; or by taking the staircase N on the first floor, passing under the tower B and through the anti-chamber P. Room J''' on the third floor (see Fig. 8), was reached in two ways: by the long staircase E E', of which we have spoken, and by the stairway which opened into the passage S. In order to understand this arrangement reference must be made to Figs. 6 and 7. In the first floor (Fig. 6), one passing along the *Chemin de Ronde*, where he was protected from the outside by the battlements of the walls, entered by the door G under the staircase E E', (see B in Fig. 11), turned to the left on a winding stair, made half a revolution, reaching I; then by means of a stairway built in the thickness of the walls, he ascended past the second floor to the passage S, and from thence to the room J'''. Room J''' was reached by the staircase which began at N (Fig. 6), and communicated with the second floor. It communicated with the third floor by means of the ante-chamber P. It is to be remembered that the staircase O connected the second and third floors.

For the sake of clearness let us recapitulate a little. The first floor could only be reached by means of traps in the floor of the second story. The side J'' on the second floor was reached by a trap in the floor of the third story. The side J', second story, by means of the stairway passing under the tower and through the ante-chamber P, or by ascending to the third floor and using the stairway O. The side J''' of the third story was reached by the stairway under the tower or by the winding stairway O, from the second floor. The side J''' by the stairway E E' or the one opening into the passage S.



(Fig. 10.)

The fourth floor is now entirely destroyed. Viollet-le-Duc has reproduced it from existing designs as shown in Fig. 9. It will be seen that it was reached from the third floor by the winding stairway O; that it consisted of only one room, the roof of which was supported by the post in the center. BB are passages leading to the machicoulises A A. Y is a small post; Z a large machicoulis opening over the long staircase E E'. The roof was probably flat and gave access to the battlements and the machicoulis located here. There is also an account of two watch-towers which rose from this roof and which were covered with lead. Fig. 10 is a section made on the line EE' FF of the floor plans, and explains the ingenious arrangement of the stairways. A is the long stairway E E'. R is the passage at the landing from which the garrison could crush the besiegers. As said, B is the entrance to the stairway opening on the *Chemin de Ronde*, and D the stairway leading from there to the passage S. Fig. 11 is the facade opening into the court. That facing the outside was protected part way by the exterior walls. Above this there was an almost total absence of openings other than those through which arrows were shot and the machicoulis or hounds above.

From the above description it will be seen that the garrison was double on the second and third floors, there being no communication between them. In order to establish such a communication it was necessary to ascend to the fourth floor, which was occupied by the commander, and from which all commands were given. While this arrangement seems cumbersome to us, it had certain advantages at a time when the troops could not be depended upon for faithful service, when the lord who could bid the highest secured the services of the troops, and could buy them to betray the baron they were ostensibly serving. Again, if one side of the donjon were taken the garrison could unite on the upper floor and attacking the assailant who could not possibly find his way in the labyrinth of passages and staircases, crush him and regain that portion already taken. If, by means of surprise or treason, the enemy succeeded in passing the long staircase E E' the defenders could steal away through the passage S, descend by the stairway I, (see plan first story), go through the gate G to the exit M, which was a secret subterranean passage communicating with the fosse. Thus they could escape from the fortress into the open country,



(Fig. 11.)

leaving the empty donjon to the enemy. Or, in case they wished to hold the fortress, after descending to the first floor, they could ascend by staircase N, cross under the tower D, (see plan second floor), enter room J' by the ante-chamber P, and go to the third floor by the winding staircase and join that part of the garrison remaining on this side of the donjon. If, however, the assailant, either by scaling or mining, (which was hardly possible), reached the hall J''' (see second story plan), the defenders could again steal away by the ante-chamber P to the staircase T, which communicated, as we have seen, both with the room J of the first floor and with the staircase N. Again, the defenders could still ascend or descend the winding staircase O, by crossing the small room V. From the landing T a platform, U, is reached by means of a staircase. This platform was commanded by loopholes in the passages S S'. The first floor was only used for the storage of provisions and played no part in the defense except as it sheltered the small guard located in the isolated room C.

There are in France three donjons built on the same general plan as that of Arques: those belonging to the chateaux of Loches, Montrichard and Beaugency. But that at Arques is unique because of its position as regards the general plan of the chateau. It is protected by the walls of the place and by two towers, while it perfectly commands the outside and could defend the place against an army approaching from the side on which it is located. It has its hidden exit through which the troops could escape in case of need; its entrance gate is well defended; it is absolutely unattackable by sapping, the only way in which the walls could be overthrown before artillery was used. Then it was so arranged that a garrison in which absolute confidence could not be placed could be used to defend it, the troops being obliged to act blindly and according to the order issued from the officer's quarters on the fourth floor. Neither treason nor surprise were practicable, because, if one part of the garrison was taken it was easy for a few determined men to hem in the assailants, cut off communication from their fellows and crush them without it being known. As a last resource the commandant and his faithful followers could escape entirely. Fire was the only means of destroying this fortress, but when one considers the width and depth of the moat, the elevation of the exterior walls, and the absence of large openings in the structure, it will be seen that there was little danger from this source, as fire could only be set to it by throwing inflammable materials into the place. The width of the fosses and slope of the counterscarp made it difficult to locate engines in such a way that this could be done.

The entire chateau, walls, donjon and gates were built of the native stone, laid up rough on the outside and inside faces, and filled in with broken stone and mortar, as was customary at that time. All the walls were of immense

thickness and great strength. The floors of the donjon were of wood, following the Norman custom. This donjon must have been impregnable before the introduction of gunpowder. It was no sooner completed than it was besieged by William the Conqueror, and only taken after a long investment, through failure of provisions. It was repaired and partly reconstructed by Henry I in 1123, and besieged in 1145 by Geoffroy Plantagenet, who was unable to take possession until after the death of its commander, who was killed by an arrow. This siege lasted an entire year. In 1202 Philip Augustus invested the chateau, but raised the siege when he heard that young Prince Arthur was a prisoner to John the Landless. Arques was the last chateau to surrender to the king of France after the conquest of Normandy from this prince.

Next month we will consider the chateaux of Roche-Guyon and Chateau Galliard.

Louis H. Gibson.

STATUARY FOR THE INDIANA MONUMENT.

OUR frontispiece this month presents photographic illustrations of the first premium designs for the large groups of bronze statuary representing "war" and "peace." Neither design has been accepted, but one of the artists whose work is shown may be selected and given the commission for the groups. These groups, when complete and in place upon the monument, will each occupy a space of twenty-two feet front by ten feet and eight inches in depth, and a height of thirty-six feet. If made great works of art, as they will be great in size, they will stand among the world's greatest achievements in bronze, and give the monument a reputation, the value of which cannot be measured in dollars, but time, and patience and talent will be required to solve the problem. Such art as required for a monument of this character is difficult to obtain, and is expensive when found. These groups should be the great features of the work, but they will not be so if undue haste is used in compliance with the clamor of the ignorant. The monument is being built for time, not for a day, and its excellence should not be jeopardized in any way. Just now, of all times, those in charge should make haste slowly; otherwise, all that has been so well done hitherto, may be ruined, and the monument, of which so much is expected, made a common-place affair. This is a critical period for the state soldiers' and sailors' monument; the more so of any through which it has passed. The commissioners have the money; now, let them give us the art, if it can be found at home or abroad.

BUILDING BUDGET.

Washington, D. C., Notes.

During the consideration of the sundry civil appropriation bill in the house recently, Representative Enloe, of Tennessee, called the attention of congress to the alleged discriminations against domestic marbles in the construction of the library building. He introduced a resolution directing the chief of engineers of the army to award all contracts for marble and other material in constructing that building, to the lowest responsible bidder, giving preference to home, over foreign products where materials of equally good quality of home production is offered at equal or lower prices. He said that the charge had been made at the public meeting of the marble producers and marble dealers in Tennessee, that the chief of engineers of the army had unjustly discriminated against the producers of American marble, in that he had refused to allow them to compete in the bidding. He was informed that of the former appropriations, the amounts used by the engineer, in the purchase of marble for the interior finishing and decoration of the building, aggregated \$600,700, and of this amount, he expended for foreign colored marble \$275,000, for Italian marbles \$325,700, Vermont marbles \$30,000 Georgia marbles \$5,500, Tennessee marble \$3,100.

Mr. Enloe's colleague, Representative Houk, addressed a letter to the chief of engineers of the army, asking him to state the reasons for this discrimination. In his reply to Mr. Houk, General Casey says: "The finishing of the interior of two rooms required marble of a tint and texture that could not be matched by the native product. The cost is no measure of the material used, but represents the labor to be put in by the workmen of this country. There has been no discrimination against Tennessee marble; and further requests for bids on native stone will include marbles from your state, as have the requests already made. Native stone has and will be used whenever suitable."

Mr. Enloe said that his colleague, in addressing this letter to the chief of engineers reflected somewhat upon the patriotism of the architect, in discriminating against American products in favor of the foreign. The architect who designed the interior and the finishing work of this building, upon being shown the letter written by General Casey, took occasion to write a letter showing that there was no necessity for going to foreign countries to get marble to finish this building in accordance with the design.

Mr. Enloe said that it seems that the reason why the chief of engineers selected foreign, instead of native marbles, was because, as alleged, he could not get exactly the tint, and he also says he could not get the texture required. In refutation of this statement, Mr. Enloe took from his desk a number of samples of Tennessee marble, which had been sent to him by various gentlemen interested in that industry in Tennessee, showing some of the different tints of marbles which are produced in the quarries of that state, and they were sufficient in variety he thought, as any man who examined them would admit, for the interior or any other decoration of any public building in the United States. He said that he had been informed that they afford a greater variety

of tints than can be found in foreign marbles, and they can be furnished in quantity sufficient for any building purposes, while it is difficult to get tints in foreign marble in quantity sufficient to carry it out in considerable plan of decoration. As for the texture, according to the best information, he had been able to obtain, the domestic marbles are far superior to those of foreign origin. In this connection he quoted an extract from resolutions adopted by the marble quarrymen in their recent convention at Knoxville, Tenn. They say: "We confidently assert that America can furnish decorative stones and marble for all interior finishings superior to the products of any foreign quarries. We pledge ourselves to verify this averment before any commission of experts, or committee appointed by congress."

Against the dictum of the chief of engineers of the army, Mr. Enloe said he would set up this challenge of the marble producers, and invite the test. He said that the Tennessee quarrymen assert that before any committee or board that may be appointed to test the relative merits of native marbles, as compared with the foreign marbles, they will show that the American marbles are superior in quality, in durability, and in greater variety of tints, and that they can be furnished at an equal or lower price, even if it is to turn on a question of taste or color. Mr. Enloe still thought that our marble producers could successfully compete if given an opportunity to do so. But he did not think that our own producers should be discriminated against in a mere matter of tint or shading and the inferior foreign marbles used in our public buildings. At this juncture upon being asked by Representative Milligan what was the comparative cost as between native and foreign marble, Mr. Enloe replied that American dealers were not allowed to compete but they assert that they will furnish better marbles, at an equal or lower price, and in sufficient quantities to meet all demands. He referred to congress adopting the policy he was advocating in regard to other public works. Our ships are not built of foreign material. There is no piece of wood or iron in a single ship in our navy that is not of American production, and not a gun of these ships but that was made of domestic material. He carried this illustration out in many additional particulars.

He said further that the government imposes a tax of sixty-five cents per cubic foot, upon foreign marble, in order to compel the people to use the American product. But when the government wants marble it goes to Italy for it. He said he was at a loss to understand the logic or patriotism of this argument. If domestic marble is good enough for the citizens, he thought it should be good enough for the government. He said that he did not believe that the government ought to be allowed to import foreign marble, and pay a duty of sixty-five cents on it, when our American marble can be used, and when the producers of American marble can furnish a better article at a lower price, and if our marble is good enough to use in private buildings, it certainly ought to be good enough for public buildings.

Mr. Livingston, of Georgia, asked Mr. Enloe if it had not been an ascertained fact that the marble of Tennessee outlasts any foreign marble. Mr. Enloe said it was, and said further, that as compared with Italian marble, Tennessee marble is not only more durable, but ventured to predict that there is no stone exporter in the United States, who would not say so, and that it is more suitable to put in a public building than Italian marble. He said that when tarnished or stained, the Tennessee marble could be cleaned, and that nothing but acid would penetrate or injure them. On the contrary, the Italian marble is more porous and brittle, and if any stain gets upon it, it cannot be cleansed, because it will be absorbed.

Mr. Enloe's resolution was agreed to by the house.

Bids for the cut-stone and brick-work on the new postoffice building in this city were opened by the supervising architect of the treasury, on the 21st inst.

The bids were divided into two classes, the first being for stone ashlar rock-faced and the second being for the entire stone facing of cut-stone. The bids were as follows:

Mt. Waldo Granite Works of Frankfort, Me.: First-class, \$897,000 for granite; second-class, \$993,000 for granite; time, 530 working days. John Pierce of New York City, first-class, \$789,000 Fox Island granite; second-class, \$870,000 for granite; time, two years and six months. Norcross Bros. of Worcester, first-class, \$998,000 for marble, \$1,033,000 for granite and \$1,044,000 for Troy granite; second-class, \$1,068,000 for marble, \$1,125,000 for granite, \$1,095,000 for Troy granite: no time given. Wm. Gray & Sons of Philadelphia, first-class, \$929,250 for marble and \$973,500 for granite; second-class, \$975,000 for marble and \$1,685,000 for granite; time, four years. The Consolidated Quarry Company of Washington, D. C., first-class, \$790,018 for granite; second-class, \$902,000 for granite; time, forty working months. Booth Bros. & Hurricane Isle Granite Company of New York, first-class, \$915,800 for granite; second-class, \$1,000,000 for granite; time, five years. L. L. Leach & Sons of Chicago, first-class, \$1,034,800 for marble, \$1,039,800 for granite; second-class, \$1,074,800 for marble, \$1,064,800 for granite; time, three years. T. W. Rogers of Brandon, Vt., first-class, \$948,600 for marble; second-class, \$788,600 for marble; time, three years and three months. Thos. R. Bentley of Milwaukee, Wis., first-class, \$1,228,000 for marble and \$837,943 for granite; second-class, \$1,328,000 for marble and \$896,442 for granite; time, three years. Georgia Marble Company, first-class, \$1,095,000 for marble; second-class, \$1,124,500 for marble; time, 1,150 days.

Pierce is the lowest bidder on granite and Rogers the lowest on marble.

Probably the best indications of the condition of the stone and marble industry of this country, is shown by the imports and exports of these articles during the year which ended with December. From the secretary of the treasury, your correspondent has obtained the subjoined statistics upon this subject.

In 1892 the imports of dutiable marble, and manufactures of the same, amounted to \$1,011,823, considerably in excess of the imports of 1891, when \$821,572 was the value of the imports. The imports for December, however, were somewhat lower than those of December a year ago, the comparative valuations being \$83,589 against \$98,691.

The dutiable imports, in 1892, of stone and manufactures of same, including slate, reached the valuations of \$513,448, being larger than the business of 1891, when \$491,294 worth was brought into this country. As in the case of marble, the December imports fell short of the December imports in 1891, the comparative valuations being \$30,606 against \$32,906.

The total valuations, therefore, of the imports of marble and stone, upon which duty was paid, amounted during the year just ended, to \$1,525,271, against \$1,312,856 in 1891.

The exports of unmanufactured marble and stone in 1892, amounted to \$150,772, which is less than the outgoing business of the previous year, which was worth \$166,892. In December, \$8,103 worth of unmanufactured marble and stone was exported, against \$9,283 worth in the same month a year ago.

The annual out shipment of roofing slate in 1892 indicated a remarkable falling off from the figures of the previous year, the comparative valuations being \$48,190 against \$69,226. In December roofing slate was exported from the United States to the value of \$6,433, which, however, shows an increase over the shipments of the same month in 1891, when \$4,112 was the value of the exports.

All other manufactures of marble and stone exported from the United States in 1892, amounted to \$566,184, being a satisfactory increase over the same business in 1891, when \$483,974 worth was exported.

The total exports, therefore, of marble and stone and the manufactures of stone dur-

ing the year of 1892 reached a valuation of \$765,146, against \$720,092 in 1891. It is gratifying to state though, that the last month in the year showed a marked increase over the business of the corresponding month in 1891. The total exports in December last amounted to \$94,579, against \$55,388 one year ago.

The re-exports of marble, and the manufactures of marble, in 1892, amounted to \$1,400, against \$2,657 in 1891.

The re-exports of stone and manufactures of same, including slate, for the year just ended, indicated a marked falling off from the re-exports of 1891, the comparative figures being \$492, against \$3,779.

The total re-exports of marble and stone and the manufactures of same, for the year, were worth \$1,892, against \$6,436 in 1891.

The dutiable imports of statuary in 1892 reached a valuation of \$2,221,024. These figures, however, include some pieces of art works, not statuary. In 1891 these imports reached a value considerably under those of the past year, being \$1,842,406.

The exports in statuary in 1891 fell off about half from the figures of 1891, the relative values being \$228,208, against \$549,051. The re-exports of statuary in 1892 amounted to \$200,404, against \$284,808 in 1891.

During the last week of congress a protest was presented in the house by Representative Townsend, of Colorado, from the directors of the Colorado Marble and Mining Company, indorsed by the Denver Chamber of Commerce and Board of Trade, the Manufacturers' Exchange of Denver, The Denver Real Estate and Stock Exchange, and the Colorado Mining Stock Exchange against the discrimination against American marble in the construction of public buildings, notably the new congressional library, in which a large quantity of Italian and other foreign marble has been used.

In the case of Gustave Wilkey, convicted in Texas of importing sixty-four foreign stone cutters in violation of the alien contract law, and sentenced to pay a fine aggregating \$70,000, President Harrison, among his last official acts, reduced the fine to \$8,000 and costs, on the ground that the prisoner's action was due to ignorance of the law, without an attempt to violate it. The costs and other expenses bring the amount to be paid up to nearly \$20,000.

The Bureau of American Republics has been informed that a deposit of grey lithographic stone, which is described as magnificent and equal in fineness of grain and quality to the lithographic stone obtained in France and Germany, has been found in the Cerro de la Origi, near Yantepec, in Mexico. The Bureau of American Republics is informed that in the exhibit which the republic of Paraguay will have at the world's fair especial attention will be given to displays of stones.

The census bureau has just completed the statistics of the marble and stone industry at Joliet, Ill., and Ft. Wayne, Ind. A condensation of facts pertaining to this industry will show the volume to which it has attained in the places mentioned. Your correspondent has been permitted to make extracts from the official figures of the bureau, through the courtesy of Superintendent Porter.

Joliet is accredited with nine marble and stone-working establishments, representing an aggregate capital of \$164,537, sub-divided as follows: Hired property, \$24,750; value of plants, \$71,400, being \$16,850 worth of land, \$5,250 in buildings and \$49,300 worth of machinery, tools and implements; total live assets, \$68,387, being \$20,095 in raw materials, \$27,925 finished product and stock in process, and \$20,367 in cash and accounts. The aggregate wages paid is \$60,362, and the number of hands employed during the year is eighty-two, of whom eighty-one are males above sixteen years of age and one female above fifteen years of age. The aggregate cost of materials used is \$119,462, being \$103,759 for principal materials, \$1,954 for fuel and \$13,749 for all other materials.

The aggregate miscellaneous expenses are \$77,924, of which \$72,000 is for contract work, \$2,244 for rent, \$900 for power and heat, \$697 for taxes, \$591 for insurance, \$935 for ordinary repairs of buildings and machinery, \$207 for interest on cash used in the business, and \$332 for all other sundries. The aggregate value of the goods manufactured is estimated to be \$281,534.

According to the census figures, Ft. Wayne, Ind., has five establishments working in marble and stone and employing an aggregate capital of \$50,150, sub-divided as follows:

Hired property \$7,500, value of plants \$19,750, being \$3,500 worth of land, \$2,100 in buildings, and \$14,150 worth of machinery, tools and implements; total live assets \$22,900, being \$4,800 in raw materials, \$11,600 finished product and stock in process, and \$6,500 in cash and accounts. The aggregate wages paid is \$36,435, and the average number of hands employed during the year is fifty-nine, all of whom are males above sixteen years. The aggregate cost of materials used is \$39,717, being \$38,783 for principal materials, \$441 for fuel, \$243 for mill supplies, and \$250 for all other materials. The aggregate miscellaneous expenses are \$1,739, of which \$450 is for rent, \$284 for taxes, \$290 for insurance, \$150 for ordinary repairs of buildings and machinery, \$300 for interest on cash used in the business, and \$265 for all other sundries. The aggregate value of the goods manufactured is placed at \$108,905.

E. A. O.

Philadelphia Notes.

Building in and around this city will be quite brisk during the current year and especially in the consumption of stone as one of the materials, indeed, we find that in the suburbs it is the prevailing and chief article desired. Where country houses are being erected upon extensive plans, and this is not confined to any particular kind, except, perhaps, local or blue limestone prevailing to some extent over others. During the spring months work will be started upon the I. O. O. F. Temple, six stories high, of Indiana limestone and buff brick, from plans by Hazelhurst & Huckel, architects. The Drexel building, also Hotel Metropole will be continued from drawings by Angus Wade, the well-known architect, located in the Hale building, the front of which will be entirely of stone from Indiana quarries. The Philadelphia & Reading terminal depot is approaching completion, in which a large amount of Eastern stone has been used. The Pennsylvania R. R. depot and adjacent buildings will be pushed with vigor; light granite being a leading feature in its construction, the remainder being red brick, terra cotta, iron and steel, from plans by Furness, Evans & Co., architects, offices in the Provident Life building of this city.

Messrs. Childs and Drexel, large land owners at Wayne, Pa., and other places along the lines of railways, have just started quite an operation of country homes at Overbrook near Philadelphia, and in which stone of various kinds will be the leading article in the walls. The construction is done under Wendell & Smith from plans by various draughtsmen. Messrs. Bailey & Truscott, architects, have just awarded a contract for a stone church at Rosemont, Pa. This structure will likely be to a great extent Indiana limestone and local blue stone with slate roof. Frank R. Watson, architect, has placed on boards for estimate plans for two fine residences for Mr. Adolph Woll of this city, to be erected of red sandstone entirely, with eight handsome granite columns supporting the porch and upper floors, red tile roof. The entire stone work will be carved and ornamented in a superior manner.

U. S. Senator M. S. Quay has just purchased a fine lot, 99x110 feet, in the city of Washington, D. C., upon which he intends to erect a fine house costing about \$100,000,

to be chiefly of brick and stone construction with a slate roof, and in this latter direction permit the suggestion that we find that about 80 per cent. of special structures are covered by slate of various kinds and colors in this section of the country. Edwin F. Bertollette, architect of this city is now engaged on plans for several fine residences and other structures in which considerable stone will be used. Mr. Bertollette is quite varied in the use of the material, and the fact that he is also a civil engineer of ability gives a wide range in experience and liberality in judgment. In the future I shall keep you posted with regard to events in this quarter in matters of interest where stone is concerned.

B.

Columbus, O., Notes.

It is almost too early to venture an exact estimate for the building season of 1893, but we think it would be safe to place it at 35 per cent. over last year. The amount invested in buildings in the state last year was \$2,129,175, compared with \$1,453,851 for the year 1891; \$1,880,291, for 1890, and \$1,756,443, for 1889.

For the city of Columbus there has been issued 1,586 building permits for 1892, out of which 338 buildings were erected. Among the finest buildings erected in 1892 may be mentioned the Henrietta Theater owned by Mr. H. Chittenden and designed by Yost & Packard, architects. There was put up near Broad and High streets a fine, nine-story building, the entire front of which is a fine buff stone; it is a model of design and is of thoroughly fire-proof construction. Among the prospects for this year may be mentioned a ten-story building on the corner of Broad and High streets, several large buildings for the United States Baking Company, several large business blocks and a number of fine residences. Outside of the city may be mentioned a large twelve-room school house, which is to be built of local limestone and trimmed with brownstone, at Sandusky, O. The contract is as yet not let.

At Marion, O., there is a high school building of nine rooms and an auditorium built of pressed brick and trimmed with Otway buff stone, also a school house of eight rooms built and trimmed as above. These are all three from the office of Yost & Packard, architects at Columbus, O. In regard to stone for paving purposes, I would say that it has been entirely superseded by brick and the different blocks. There will probably be a great deal of street improvement, and, consequently, a large amount of curbing.

MONROE BLAKE, JR.

Nuggets from the Northwest.

The biggest man-made stone pile in these parts will be the Minneapolis court house and city hall building when completed. When and how to complete it, is the problem that is worrying the citizens, commissioners and legislators. The massive granite walls of the county's half of the structure are up and the roof nearly inclosed. On the city's half the walls are not very far above the basement, and yet the \$1,500,000 which was originally appropriated for the building is "out of sight." The work is being done by contracts for the different parts of the big job, and while it is not alleged that there has been any "jobbery," there is considerable complaint about the way the bills are piling up. According to the lowest estimate now furnished, it will take \$3,000,000 to finish and furnish the building. It is proposed to delay completing the city side, as the demand for it is not so imperative as for the county's portion. It has been proposed to do nothing more on the city side, but it is hardly likely that the public will be satisfied unless the walls are run up and the building given a respectable external appearance. The interior finishing may be deferred. In the scheme which the legislative delegation

has approved, it is figured that there is granite, stone and brick work yet to be contracted for, amounting to \$377,841.45. The cost of the marble work is estimated at \$30,000.

Minneapolis will use a large amount of Lake Superior brown sandstone this season. This is perhaps the most popular stone here nowadays. Its use as a trimming for pressed brick walls is especially common. Red pressed brick and brown stone trimmings is the regulation combination for tenement rows and "flat" buildings, and there is something verging on a "boom" in this class of buildings. Brownstone has also been used a great deal in church buildings, and among this year's notable projects is an edifice for the Third Universalist Society, in which the Lake Superior sandstone will be used to the top of the water table with red brick and stone trimmings above.

It looks at this writing as though the legislature would appropriate funds for a chapel and library building for the state university in this city. The building is much needed and will be a large and handsome one. Most of the new university buildings are of brick, with the notable exception of Pillsbury Science Hall; but it is likely this one will be of stone. Details have not been decided yet, of course.

The Farmers' and Mechanics' Savings Bank of Minneapolis has taken possession of one of the finest exclusive banking buildings in the northwest. The front is of limestone with heavy marble pillars and the interior is resplendent with marble. The floor, dado, and main wall are mosaic finish. The colors of the marble, red, grey, brown, pink and buff are beautifully blended. The teller's cage is of Sienna marble, the frieze of Campanvert and the circles in the iron roof of Lambartine, with Saracolin in the vestibule.

At the corner of Nicollet avenue and Third street—about the liveliest in the city—the Plymouth Clothing House is about to indulge in a luxury new to this section, a sidewalk made of French flint flagstone, made to order in France. The surface of this tremendously hard substance will be grooved to prevent slipperiness.

The North Star Granite Quarries, located at Ortonville, Minn., have been bought by Fargo, N. D., capitalists who have organized a company with \$300,000 capital, and will commence active operations in the spring. A. L. Drake is president and E. A. Mears, secretary, both Fargo men.

Minnesota needs a new capitol building badly and it is only a matter of time when she will get one. A strenuous effort is being made to get a measure through the present legislature providing for taking steps in this direction. There is some opposition and a deal of scheming as to location and the bill may not wiggle through. The program is to start out with the idea of spending not to exceed \$2,000,000 on the building. A bill appropriating \$150,000 for a building for the State Historical Society and Library has got well started. In case a new capitol was built it might be that suitable quarters could be provided for the Historical Society and avoid the necessity for a separate building.

The legislature of North Dakota made liberal appropriations for buildings. Detailed plans have not yet been made but stone and marble will naturally enter largely into the construction. The appropriations are, Mayville Normal School, \$30,000; Insane Asylum, \$40,000; governor's residence, \$6,000; completing Soldiers' Home at Lisbon, \$20,000; Agricultural College buildings, Fargo, \$60,000; Reform School at Madison, \$10,000; money necessary for completing Deaf and Dumb Asylum at Devil's Lake; money for completing capitol building at Bismarck.

A notable feature of Minnesota's contribution to the world's fair will be the drinking fountain which the city of Mankato will send, carved and constructed entirely of Mankato stone. It will be nine feet high and will weigh between 4,000 and 5,000 pounds. From the Mankato quarries will come a large stone for the arch in the state building.

The Board of Trade of the city recently kicked on the stone selected for the purpose, it being reported that it is full of sand holes.

The Western Granite Company has been sued by K. A. Johnson, of St. Cloud, Minn., for \$5,000 for injuries alleged to be due to a defective derrick.

Samuel C. Shelton, of Springfield, S. D., has been awarded the contract for setting monuments of Sioux Falls granite to mark the boundary line between South Dakota and Nebraska. His bid was \$9,535.50, which is considered very low.

Joseph A. Taylor was arrested in Duluth a couple of weeks ago on the charge of obtaining money under false pretenses. He represented that he had an option on land in Dorion, Ont., which was rich in jasper and organized the Lake Superior Company with \$500,000 capital, and got a good many shining dollars invested. It turned out that the jasper was in Taylor's eye.

The Board of Public Works of Tacoma, Wash., is figuring on paving Pacific avenue with bituminous rock. Sioux Falls, S. D., figures on getting an additional appropriation of \$35,000 for making its federal building fire-proof.

P. H. Edmison will build a three-story stone block at Sioux Falls, S. D., this season.

At Litchfield, Minn., the Meeker County Bank has plans for a \$20,000 building, including red sandstone walls and granite pillars.

The school board at Sioux City, Iowa, will use brownstone trimmings in a two-story brick school house at Morning Side.

W. L. Dow has made plans for a handsome bank building for M. J. Lewis at Vermillion, S. D. Sioux Falls jasper and red sandstone will be used in the walls.

Up to March 28, architects will submit competitive plans for a large, fire-proof city hall building at Davenport, Iowa. There will, of course, be much stone used, though the material is not specified.

At Great Falls, Mont., Edward Canary will build four residences with cut-stone fronts. Architect Whyte makes the plans.

C. A. Meck is putting up a four-story block at Davenport, Iowa, of stone and terra cotta. J. W. Ross is the architect.

C. J. Brackenbush has made plans for a market and exposition building at Sioux City, Iowa, of stone and brick. Final details not decided.

It is not likely much granite pavement will be laid in the northwest this year. A "boom" for cedar blocks on concrete foundation has struck the country. There is some talk of granite for repairing a portion of Third street, St. Paul.

Minneapolis, Minn., March 7, 1893.

CHAPIN.

Building in Buffalo.

One of the advantages which the Bison City prides herself in having is the greatest number of miles of asphalt streets of any city in the world. This is a broad assertion but figures are facts and it is hard to go back of them. The latest statistics give the number of miles as 126. Ten more are contracted for before the snow has disappeared and by the time the ground is fairly thawed out the asphalt companies will have their hands full of jobs. The Barber Asphalt Company and the German Rock Asphalt Company are the largest concerns here, and the amount of work they have done is wonderful. With the large turns in real estate now being made in and about the city a demand for pavements is created. Stone is used to a great extent but asphalt reigns supreme. The quality of stone generally used is excellent. Limestone and red sandstone figure conspicuously and are obtained from the Medina and Lockport quarries. Buffalo furnishes a goodly quantity also. The cost of work on streets last year to the city, was

\$1,592,660. The latest complaint to our Board of Public Works is one made by the producers of Medina block paving stone. Medina stone is widely known, has an excellent reputation and is in great demand, but still its producers claim the board is giving them no show on bids recently let for pavements. They say they have been practically barred out of the market and that the asphalt paving companies who are getting the most of the work are favored by the board. What they ask is that the board discontinue this "favoritism" and give them a fair show. The board claims they are given an equal chance with the asphalt companies and says the agitators of new pavements on various streets about the city have gone so far most of the time as to specify Medina sandstone. In fact they have declared they would have no other material. The Medina stone has unquestionably been used in large quantities here and with universal satisfaction, and should not be discriminated against.

An interesting item to masons has been the securing of the contract for repairing the city's sidewalks for 1893. There was a sharp competition between those who entered and the lowest bidders have to do the work at no "fortune" prices. The city was divided into three sidewalk districts and bids were received upon each district. P. B. McNaughton, a prominent mason was the lowest bidder on the whole job and John Johnson on section 2, the work on which he will probably get. Mr. McNaughton's bid per lineal foot for constructing sidewalks complete, including grading, not to exceed six inches and setting one post when necessary, was 17½ cents; for repairing sidewalks, six cents per lineal foot; for constructing sidewalks complete, including excavation and leveling, twenty cents; for repairing crosswalks, one cent, and for excavating and filling seventeen cents per cubic yard. Chas. L. Weisner, secretary of the Vameralth Stone Company which operates in the largest quarry districts of the city says the outlook for a big demand for stone this year is better than it ever has been before. Nothing can be done for a month yet, on account of the severe weather, but when operations are commenced it will take weeks to supply the present demand for stone. Flint and limestone are the varieties obtained mostly about the city and the quarries are located near each other. In the vicinity of Kensington one of the city's suburbs which has recently had a great real estate boom, are several big deposits of rich stone for building purposes and it is here work will be pushed at once. Immense quantities of water fill up the cavities of the quarries at this time of the year, but if it will cease to rain and snow these difficulties can easily be contended with.

A quantity surveyor is a new acquisition talked of for the building trade in this city. He would make estimates on the cost of work and furnish them to masons and builders at a stated price, giving a bond as security for the correctness of the estimates. Such a man is said to be valuable and he is found throughout England where the idea first originated. A great waste of time and expense would be saved the builders if they could secure such a man, but nothing has been done yet. A committee from the Exchange are at present considering the matter. E. & J. Lannen, two of the city's prominent mason contractors, made a blunder recently which lost for them a fat job. Their bid on the stone work for the new Crystal Oil Refinery's plant was the lowest and the job was awarded to them. When notified that they were successful they discovered that they had made a mistake of \$1,000 and asked to be relieved. Ricker & Wing, their civil engineers who have the work in charge, very kindly did this and a new contractor will be given the work. At this writing his identity has not been made known. The new building to be erected by the Real Estate Exchange is to cost about \$400,000. The securing of the contracts for the various grades of work will not be awarded for some time yet, but builders and masons will work hard to get a slice of the work. Plans are now in the architect's hands. Our new superintendent of buildings, ex-alderman P. J.

Myers, is feeling happier now than he was when he got the position. His salary has been raised from \$2,500 to \$3,000 which is done because of the great increase in the value of the city's buildings. Large buildings prospected for the city, such as the new postoffice, the Wells building, the million-dollar theater, the big drug and paint house, the Oppenheim-Hofeller building and others in which stone will figure conspicuously have not been started yet, but contracts will be let in a short time.

The building of handsome flats about the city is very brisk as spring opens up and many of the architects and builders have already secured work on this style of buildings. Pressed brick, red sandstone and flint stone are used largely in the construction of the flats which are generally built about three stories high. The Whitmore quarries at Lockport in which rich deposits of red sandstone are yearly extracted, have apparently lost none of their prime quality. The farther in the drills go the more rock is encountered and large quantities of it will be cut out this season. Whitmore & Co. furnish stone to many Buffalo parties. Limestone is also found in their quarries to a great extent. At the last quarterly meeting of the Builders' Exchange, a grading list of the manufactured white pine lumber to be used in the erection of buildings was submitted by the Planing Mill and Wood Workers' Association and adopted by the Exchange. It specifies that all lumber used must be free from such defects as knots and sap and states the requirements in lumber as used for flooring, ceiling and siding. The increase in the number of building permits issued recently by the Bureau of Buildings shows that masons, builders and quarrymen will receive the direct benefits in a short time. No "sky-scrapers" have been started yet, but several are prospected and if they only pull through what a prosperous season it means to the manipulators of the drill, hammer and trowel. Peter J. Straub, who has immense quarry interests about the city, will work the limestone quarries near Lockport, which he leases every year, to their full capacity, again this year. The stone taken from these quarries is of an excellent formation of rock and is easily brought to Buffalo by way of the Erie canal.

F. C. M. Lautz, who is one of the city's well-known marble dealers, is as popular among musical people as he is in the marble world. A grand complimentary concert was tendered him on March 14, by the Buffalo Symphony Orchestra. Mr. Lautz is a talented musician himself and is one of the city's wealthiest men. Charles A. Rupp, whom the National Association of Builders elected as its second vice-president at its convention in St. Louis last month, is one of the most popular mason-contractors of the city. He is a member of the firm of Rumrill & Rupp and has been in the business for many years. His many friends here as well as all over the country look upon him as the best man that could have been selected for the place. His election brings the convention to Buffalo in 1896. This is an event which the builders will prepare to celebrate in great style.

John Hanigan, a marble dealer at Warsaw, has received an elegant piece of statuary for the top of a large monument erected by Jabez Shaver and G. W. Farman at Gainesville last summer. It is of white Italian marble and is a female figure representing "Hope." Those who have seen it say it is one of the finest specimens of marble work ever used for monumental purposes.

BISON.

RECEIVED BOTH AND PLEASED.

"Received the swivel curved pen in good order and receipt for subscription. Am well pleased with the pen and more so with the journal."—*Geo. P. Schott, Leavenworth, Kan.*

A BUILDING STONE POOL.

THE product of all the building stone quarried in the northern part of Ohio will hereafter be controlled by two companies. A number of quarries have united their interests under the name of the Northern Ohio Stone Company. The companies included are the Ohio Stone Company, the Malone Stone Company, the Grafton Stone Company, the Forest City Stone Company, the Baillie Stone Company and the Elyria Stone Company. The capital stock of the new company is \$25,000, but it is merely nominal, and gives no indication of its resources or business scope. Mr. W. C. Stewart, general manager of the new company, says: "The various companies have been working under a disadvantage and it has been felt for a long time that if our interests could be united it would be beneficial to all concerned—the public as well as ourselves. This new company was formed to handle the product of our quarries. The various companies will retain their individuality as heretofore, but the new arrangement will make it possible to carry on our business in a more economical manner. In the past each company has been obliged to keep men on the road to sell stone, maintain a distributing yard in Cleveland, and bear the other expenses of a complete business organization. Our business will be transacted in the future by this new company. Half the yards in Cleveland will be closed, traveling salesmen will be called in, and other expenses will be correspondingly reduced. As an example of the saving it might be said that to keep a man on the road costs about \$3,000 a year. The different companies have arranged to sell their product to this central company and the latter will dispose of it to dealers. While the capital stock of the new company is placed at only \$25,000 it is in fact backed by the resources of all the other companies, so that the amount of money actually invested in the business will approximate \$2,000,000. There will be no increase in prices, the tendency will be rather to the contrary. There will be no lack of competition, because the Cleveland Stone Company deals in the same kind of stone as is obtained from our quarries. But we shall be placed on a better footing. As I said, the new way of disposing of our product is more economical than when each company went into the market on its own account. Another advantage will be the fact that the new company will carry different kinds of stone. At present a contractor usually has to deal with several of our companies, but in the future all his wants will be supplied by the new company. The latter is also authorized by its charter to operate quarries and to deal in stone other than that produced by the auxiliary companies. We have already embarked in business, so you see it is neither a trust nor a monopoly but an improved system of transacting business that will be of general advantage."

POTSDAM RED SANDSTONE.



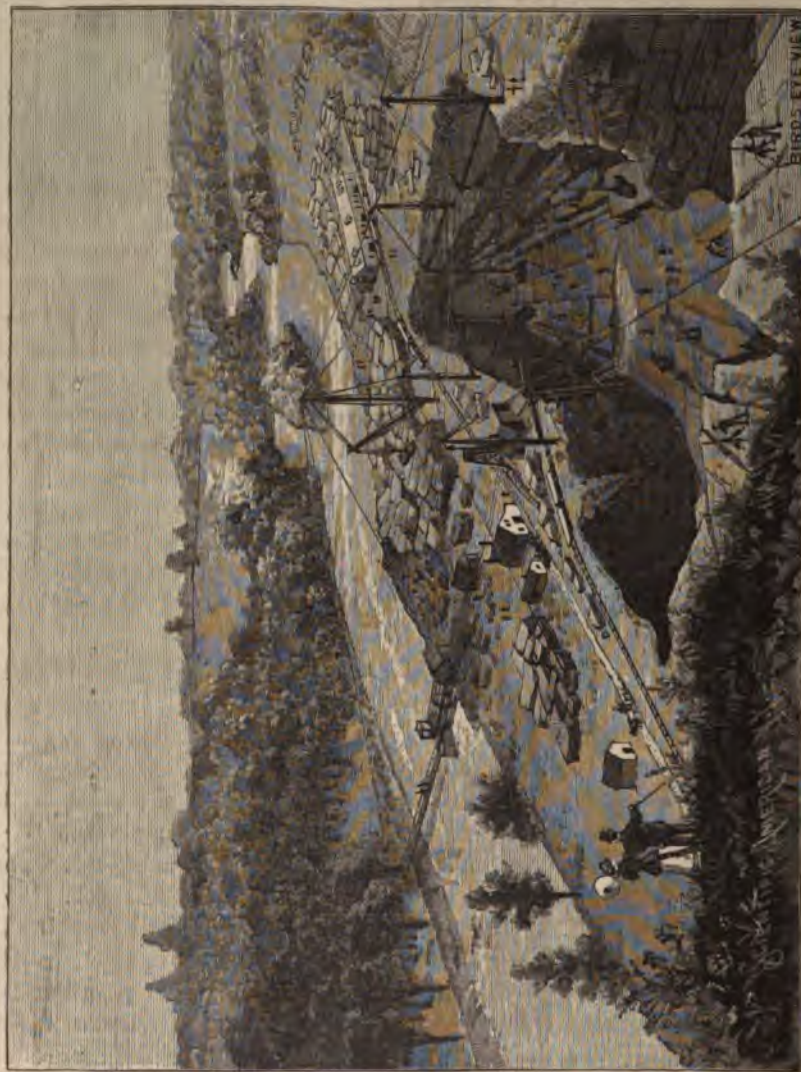
VISIT to the quarries of the Potsdam Red Sandstone Company, Potsdam, N. Y., would well repay anyone for the expense. Besides the very interesting fact that there is to be seen what the scientists declare to be the oldest part of the earth's surface, the magnitude of the work and the beauty of the material, as it comes from the finisher's hands, are sufficient to afford both entertainment and amusement. The illustrations of the quarries and workshops of the Potsdam Red Sandstone Company, tell their own story. They show the immense scale on which the operations are carried on. Quarry No. 1, from which the main supply is derived, is shown in two cuts. The peculiar stratification of the rock is very noticeable. It is exceedingly regular, with sudden variations in the dip. The drainage of the quarry is effected by an undershot water wheel, shown in the bird's-eye view to the left of the picture. From Quarry No. 2, now under development, a medium red stone is taken. This quarry, for a long time to come, will be self-draining, as will also be the case with Quarries Nos. 3 and 4. From Quarry No. 3, a dark red stone is taken.

The Racquette river, on account of falls and rapids, is not navigable, although it is the second largest river in New York, but great numbers of logs are floated down it every year from the Adirondack forests. A fall on their quarry property gives the company nearly 20,000 horse power, the entire river falling about sixty feet, and this will be of great value in the future development of the business, giving by means of compressed air or electricity ample power for working the machinery now using steam, and for other purposes. The different quarries afford a choice of color. Some layers are strongly banded in different colors. With these the most beautiful architectural effects can be produced. The combination of light, medium and dark red stone in solid colors, and the banded variety gives great latitude to the architect in producing color effects. The color harmonizes excellently with granite or brick, and instances of this use are numerous.

On this subject Dr. J. S. Newberry, professor of geology in the Columbia College School of Mines says: "In the west quarries, the typical red Potsdam, either plain or banded, prevails. On the southern tracts are outcrops of homogeneous and monochrome, chocolate-colored stone in heavy ledges,

c—Stone.

which will yield blocks of any desired size, while in their quarries on the east side are exposed about fifty feet of rather massive layers, separated by a band of fifteen feet of foundation or bridge stone. The upper and lower



bands composing the fifty feet referred to, are mainly of light-colored homogeneous stone, to which I was a stranger before visiting the quarries. This is of a reddish cream color, very uniform in tint and pleasing to the eye. It comes out in layers from two to six feet in thickness and splits with

ease and certainty in any direction. With the chocolate colored stone it may be combined with fine effect, one variety being used for trimming to the other, as corner-stones, door and window caps, porches, etc., or asso-

ciated as block stones in plain walls. This cream-colored variety works with comparative ease, and may be wrought into moulding and ornaments much more cheaply than the harder varieties; which will be best used when hammered, a style of treatment to which every phase of the stone will lend itself as it breaks true and even under the hammer."

The different tracts of and controlled by the Potsdam Red Sandstone

PRIVATE RESIDENCE BUILT OF POTSDAM RED SANDSTONE

Company comprises about 200 acres, distributed for about a mile up and down Racquette river, and selected with judgment so as to embrace the best outcrops of stones found in the district. On all these tracts the Potsdam sandstone is practically the surface rock, being covered only with a layer of greater or less thickness of boulder clay. In quantity, therefore, the quarries are practically inexhaustible, and it is not too much to say that they may be worked for centuries without embarrassment. The conditions of climate have much to do with the durability of most building stones. The failure of many building stones to exhibit durability is due to the fact that the severity of the climate of Northern portions of the United States is very hard upon the permanence of a building stone,



PRIVATE RESIDENCE BUILT OF POTSDAM RED SANDSTONE,

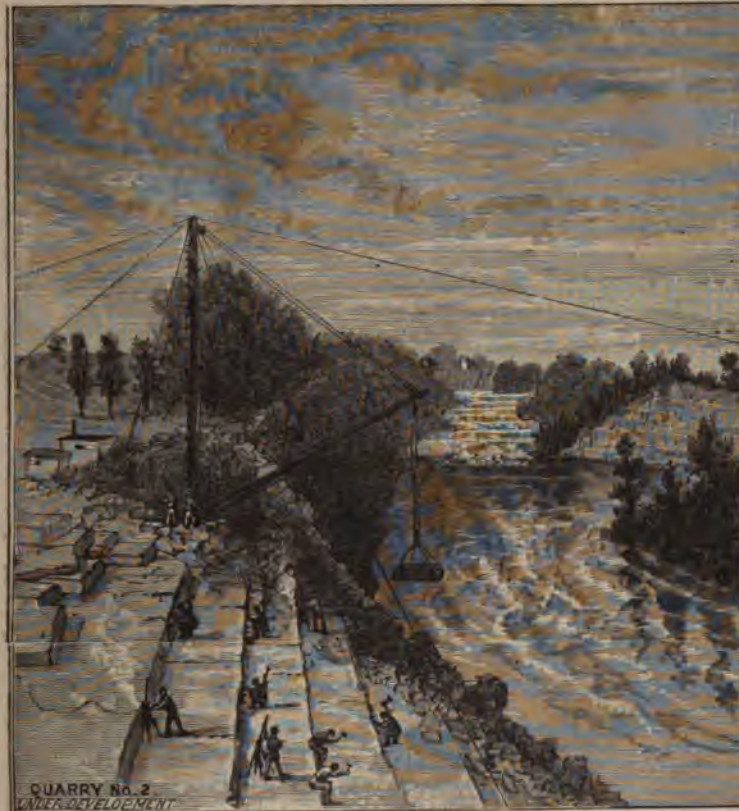
and demands that only those shall be chosen for the construction of external walls that are known to be capable of resisting the extremes of heat and frost without suffering injury. It is obvious, then, that in our north-



QUARRY NO. 1 OF THE POTSDAM RED SANDSTONE COMPANY.

ern climate, building stones are exposed to much more severe service than in the more evenly-tempered sections; and from this fact the inference is obvious that only the very highest qualifications will suffice to render a building stone suitable to stand the severe weather.

The ability to withstand the weather unimpaired means that the stone shall be so dense as to practically resist the penetration of moisture, which, by subsequent freezing, will cause it to flake or weaken it. Other things being equal, great durability in a building stone is associated with great strength to resist crushing beneath a weight placed upon it; and this quali-



QUARRY NO. 2 OF THE POTSDAM RED SANDSTONE COMPANY.

ty also is of prime importance. Next in rank among the qualifications of such a stone is its ability to withstand the action of fire. There are many stones classed among the granites and gneisses that are sufficiently closed-grained to be only slightly absorbent of moisture, and which are possessed of strength in excess of all ordinary requirements, but which exhibit a fatal weakness when exposed to the heat of a fierce fire. The limestones (and marbles), of course, are not to be considered in this connection at all. They would be calcined by the fire, and the walls would fall; but many of the sandstones, and even the granites, exhibit their deficiency in this respect, as

has been noticed in several notable cases, where the stream from the firemen's hose, directed upon such walls, has caused the red-hot stones to split and fly to pieces with almost explosive violence. Such extreme con-



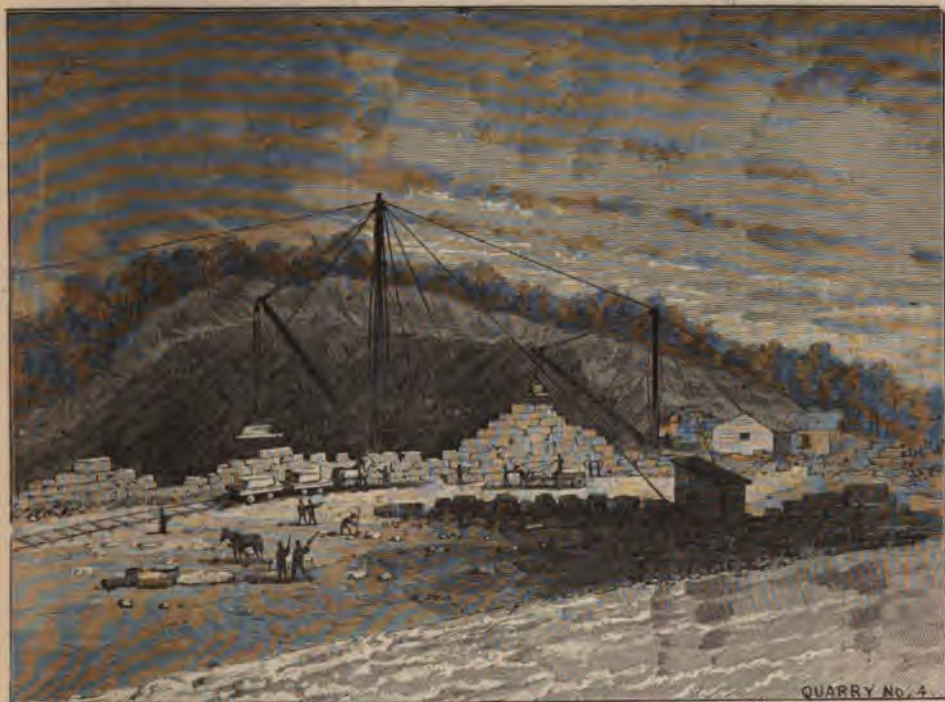
QUARRY NO. 3 OF THE POTSDAM RED SANDSTONE COMPANY.

ditions, it is true, are hardly fair to set up as a test of the general fitness of a building stone; but if there be building stones capable of withstanding them successfully, it is proper that their superiority should be known and acknowledged.

Last of all, from the technical point of view, though first from the artistic standpoint, the building stone should be pleasing in appearance and color.

and should possess the quality of weathering after exposure in the wall, to a neutral tint, and should not afford a foothold for the growth of fungi and other low forms of vegetation which hasten its superficial decay, while rendering it dingy in appearance. In discussing the points, probably no more forcible presentation of the merits of the Potsdam stone can be given than that which is found in the *Manufacturer and Builder*, a technical periodical of national circulation. In its January issue it says:

"There is found in the United States an exceedingly dense sandstone,



QUARRY NO. 4 OF THE POTSDAM RED SANDSTONE COMPANY.

which, in the judgment of qualified experts, answers the foregoing bill of particulars so completely and in almost every respect, that they have unanimously chosen it as the typical example of a building stone that most closely approximates to what a perfect building stone should be. This unique production of Nature is known as the Potsdam sandstone. It is one of the oldest of the fragmentary rocks, being the lowest member of the Silurian group, where it is found resting on the primitive, or azoic, rocks. As it has been observed at various places, its condition varies from a typical quartzite—a dense and apparently homogeneous mass of quartz—to a friable

sand rock. At other points it is found in great beds, evenly stratified, forming a material of high value for constructive purposes. In the neighborhood of Potsdam, N. Y., it has been found in great abundance, and of the highest average quality."

Time is a great tester, and the value of the stone has been proven in this way. At Potsdam there are buildings constructed of this stone which have stood for over seventy years. Yet exposed for this length of time to the trying climate of Northern New York the stone has preserved its fresh appearance and has not yielded in the least, the tool marks being as clearly discernible as if made yesterday. Prof. Newberry has expressed the opinion that "had the obelisk now standing in our Central Park been composed of such a dense, homogeneous sandstone, as Potsdam sandstone, it would



SELECTING DIMENSION STONES, POTSDAM RED SANDSTONE QUARRY.

to-day be as perfect as when erected at Tanis, 1500 B. C." This very obelisk, which suffered so much on exposure to our climate, is made of granite.

The *Manufacturer and Builder* prints a table compiled from a report of the chief of engineers, U. S. A., and from tests made by other experts, as to the crushing strength of sixty of the most noted building stones of the United States. The highest result is given in each case, and while all of the others were crushed by a pressure of less than 20,000 pounds, the Potsdam sandstone was not crushed when a pressure of 42,804 pounds was applied. Referring to other tests, the *Scientific American* says: "Although extremely



PARLIAMENT BUILDINGS, OTTAWA, BUILT OF POTSDAM RED SANDSTONE.

hard it can be wrought into all the shapes demanded by modern building, including the most exquisite carvings and mouldings. Its strength is great. It has been tested on the Emery testing machine at Columbia College, and proved to be of extraordinary compressive strength. Some pieces placed in the machine and subjected to a stress broke at a little over 18,000 pounds to the square inch. This figure brings it as regards strength quite out of the range of most sandstones and limestones and makes it surpass the majority of granites. But one marble and one sandstone in a very long list approaches this strength. What is still more extraordinary is that two inch cubes from one of the quarries proved too strong to be broken by the testing machine, although the pressure was carried to 151,000 pounds. This test reduces to a compressive strength of nearly 43,000 pounds to the square inch, or more than double the strength of the best granite.

Reference has been made as to the poor quality of granite as a resistant of fire. The action of a conflagration on granite is to cause it to flake off;

walls composed entirely of this material may thus become so reduced in thickness as to fall. It is there that the qualities of Potsdam sandstone appear at their best. It is so absolutely fire resisting, its granular structure so completely prevents it from cracking, that it can be heated to a red or white heat without injury. By many foundrymen it is preferred to fire-brick for lining cupolas, and in the vicinity of quarries is always used for lining lime kilns. The report of Prof. Wilbur, of Rutgers College, to Dr. Smock, the New York state

economic geologist, showed that

this stone withstood repeated heating to the temperature of melted copper, and sudden cooling, without injury or change of color—something which no other stone of the large number tested by him could do.

Prof. Wilbur also says in regard to its resistance of frost and acid tests: "A large number of stone were under investigation at the same time. Subjected to the severest freezing and thawing tests, Potsdam sandstone was absolutely unchanged. Submitted to the continued action of dilute sulphuric acid, Potsdam sandstone lost less in weight than any other stone—namely, two one-hundredths of one per cent., some stones losing over 300



RESIDENCE BUILT OF POTSDAM RED SANDSTONE.

times as much (over 6 per cent). This result is of the utmost importance in view of the amount of this acid constantly present in the air of our cities, and perhaps promoting the decay of building stones used in them, as much as any other one cause. The percentage of loss or gain in weight when immersed in sulphurous acid gas, was in the case of Potsdam sandstone six one-thousandths of one per cent. only, many other stones being affected to an amount from ten to seventy times greater."

Referring to the acid tests, the *Scientific American* says: "We have said that granite may be weather-resisting. While this is very true, it may be equally true that other samples will fail to withstand the American climate. To determine, as well as possible, what the action of the weather, including a contaminated city atmosphere, might be on Potsdam sandstone, it has



COLUMBIA COLLEGE, NEW YORK.

been tested by subjection to acid and sulphurous acid gas. Dilute sulphuric acid, after long action, dissolved only two one-hundredths of one per cent., or a mere trace, while some stones lost over 6 per cent. Sulphurous acid gas only changed its weight six one-thousandths of one per cent. These two tests are designed to represent the action upon it of the city atmosphere. As a direct test, samples have been repeatedly subjected to the severest freezing and thawing, and have remained absolutely unaffected."

The same paper says: "As a weather resistant pure crystalline quartz would be the best of all materials. This, of course, being out of the question, the next best thing would be in the line of a flint rock or quartzite

To the latter type, the Potsdam sandstone is closely assimilated. It departs far enough from it to be workable." In his new work on the building stones of the United States, Dr. Geo. P. Merrill, of the Smithsonian Institution, says: "I consider this, from the standpoint of durability, almost an ideal stone. It is practically non-absorptive, and its surface affords no foothold for growing organism."

A perfect building stone is far from being a common product of nature. To be qualified as a perfect building material, a stone must unite the qualities of resistance to weather and fire, must be of good appearance and impervious to moisture. It should also not be of such a tint as to become dingy or of ugly color when exposed. The streets of this and other cities furnish the best possible example of defective building stones. Brownstone buildings are seen whose carved portions are disintegrating and the faces of whose smooth wall pieces are flaking off. To avoid this destruction various suggestions and experiments have been made either in the way of chemical treatment or method of laying, but nothing seems to stop it. The experience of Boston and other cities has demonstrated how poor a resistant to fire is granite. Granite is often a stone of handsome appearance, and will in some cases stand any amount of exposure to the elements, but it is very unsatisfactory in the presence of a conflagration. Although stone is everywhere recognized as the noblest and most desirable of building materials, yet so great has the difficulty of securing good stone become that many large buildings are built entirely of brick and terra cotta, the art of man being relied upon to surpass nature.

The Potsdam sandstone is a member of the lower Silurian group and rests upon the primitive rocks of the Eozoic. This lower portion of the Potsdam formation varies from an absolute quartzite to a sand. In the quarries of the Potsdam Red Sandstone Company the famous sandstone is attacked at the place where it seems to be of the best average quality. A thickness of seventy feet is exposed in the quarries. At this point it is almost a quartzite. The examination of a microscopic section of the rock discloses the following characters: It is found to consist of angular grains of clear quartz, quite unmixed with other granular material. There is no feldspar or mica intermingled with it. The interstices between the grains contain a cementing material. This is found to be a clear, colorless, silicious cement, so that the rock is virtually silica. On this point, Prof. Thomas Egleston, of Columbia College School of Mines, and an authority on building stones in the United States, in a paper read before the American Society of Civil Engineers, on the decay of building stones, says:

"Of the sandstones having a silicious binding material, Potsdam sandstone, which has been used in the recently constructed Columbia College [an engraving of which is published herewith], and the silicious triassic

sandstone, which was the material used in the lower part of the cathedral at Rodez, are the best examples, and in these no decomposition takes place. Of these sandstones, it will be noticed that there are two general varieties, one in which the quartz grains are more or less large, and are rounded, but are cemented together by silica. * * * In the Potsdam sandstone, on the contrary, the grain of the quartz is quite small; its shape, when it can be distinguished at all by a magnifying glass, is always angular. * * * This is the best of all building materials, though mouldings made of the other variety, (larger grains), will last for many years without suffering any appreciable amount of deterioration."

The other sandstones vary greatly from this. In many cases the quartz grains, which form a body of sandstone, are mixed with grains of feldspar



STONE-CUTTING SHOP OF THE POTSDAM RED SANDSTONE COMPANY.

and mica, which in themselves present at least a chance or probability of decay. The cementing material also varies; it may be of argillaceous nature or may be even a calcium carbonate. As cements all these are defective. They always tend to yield to the weather. Accompanying the illustrations of the quarries are some pictures of buildings that have been constructed of Potsdam stone. The parliament buildings at Ottawa, and the Columbia College, New York, are the most noted of these structures. They are splendid monuments to the merit of this stone. One is the indorsement of a government and the other is the equally valuable testimony of an institution which is controlled by some of the greatest scientists in the country.

AMERICAN LITHOGRAPHIC STONES.

LITHOGRAPHIC limestone is the product of different geological formations. If it is true that any limestone of fine, even grain can be used in the lithographer's art, it is equally true that such material seems to be very difficult to find, although we have immense tracts of calcareous deposits to select from. Of the various samples of limestone which have been tested for lithographing purposes, many show in outward appearance a very close resemblance in grain and structure to varieties known to be good, but prove nevertheless worthless. To ascertain the real cause, a physical examination seems insufficient, and on the other hand the chemical examination, so far as has come under my notice, does not show sufficient grounds for the established distinction. I quote here the analytical results given in the "Report of Mineral Resources of the United States, 1893," as follows:

STONE FROM MISSOURI.	
Silicates.....	31.2
CaCO ₃	817.7
MgCO ₃	151.0
Fe ₂ O ₃	0.1
	1000.0
STONE FROM BAVARIA.	
Silicates.....	44.5
CaCO ₃	814.7
MgCO ₃	138.3
Fe ₂ O ₃	2.5
	1000.0

Nothing here would indicate any practical difference, and as it is reasonably sure that in physical properties, fineness of grain, etc., these stones resembled each other, a distinction for practical use could not be deduced from these analyses. To obtain, however, material for comparison, I procured German stones of undoubted good qualities as lithographic stone, and selected two, one of dark blue and one of light yellow color, with these results:

DARK BLUE STONE FROM SOLENHOFEN.	
Spec. gravity at 15.5°=2.952.	
Insoluble silicate.....	2.0000
Organic matter.....	0.7200
CaCO ₃	90.9341
MgCO ₃	3.5710
Soluble silica.....	0.5200
Al ₂ O ₃	0.5840
Fe ₂ O ₃	0.2360
FeO.....	0.1300
Water.....	0.4000
	99.951

AMERICAN LITHOGRAPHIC STONES.

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LIGHT YELLOW STONE FROM SOLENHOFEN.

Spec. gravity at 15.5°=2.8388.

Insoluble silicate.....	1.8930
Organic matter.....	0.1320
Soluble silica.....	0.0200
CaCO ₃	89.5390
MgCO ₃	4.3801
Al ₂ O ₃	0.1010
Fe ₂ O ₃	0.3210
FeO.....	0.0030
Water.....	1.3790

97.7681

LIGHT GRAY STONE FROM KENTUCKY.

Spec. gravity at 15.5°=2.99331.

Insoluble silicate.....	11.500
Organic matter.....	0.400
CaCO ₃	73.241
MgCO ₃	12.431
Al ₂ O ₃	1.141
Soluble silica }.....	
Fe ₂ O ₃ }.....	
Water.....	0.935

99.648

BLUE STONE FROM IOWA.

Spec. gravity at 15.5°=2.8173.

Insoluble silicate.....	6.97500
Organic matter.....	3.30000
CaCO ₃	82.20051
Fe ₂ O ₃	1.07631
Al ₂ O ₃	
Soluble silica }.....	
MgCO ₃	4.32703
Water.....	0.24001

98.11886

LIGHT GRAY STONE FROM MISSOURI.

Spec. gravity at 15.5°=2.7558.

Insoluble silicate.....	4.300
Organic matter.....	1.830
CaCO ₃	77.031
MgCO ₃	14.271
Fe ₂ O ₃	2.143
Al ₂ O ₃	
SiO ₂	
Water.....	0.341

99.916

LIGHT BLUE GRAY STONE FROM CANADA.

Spec. gravity at 15.5°=2.8388.

Insoluble silicate.....	3.71200
Organic matter.....	0.40910
CaCO ₃	89.98900
MgCO ₃	2.78932
Al ₂ O ₃ and SiO ₂	0.73101
Fe ₂ O ₃	0.15302
FeO.....	0.10431
Water.....	1.25000

99.13776

DARK BLUE STONE FROM CANADA.

Spec. gravity at 15.5°=2.89104.

Insoluble silicate.....	3.6000
Organic matter.....	1.290
CaCO ₃	88.0341
MgCO ₃	2.5000
Soluble silica.....	0.4900
Al ₂ O ₃	0.5770
Fe ₂ O ₃	0.3590
FeO.....	0.0410
Water.....	1.3601
	<hr/>
	99.2512

I observed that in a number of stones analyzed, in drying at 100°, a certain amount of organic matter volatilizes and escapes with the moisture contained in the stones. In most cases, therefore, the quantity of water will be found too high at the expense of organic matter. The latter contains nitrogen and traces of iodine, and is evidently the remnant of cretaceous fossils, and the silica may also originate from these fossils. It is certain that these organic remains cause the difference in the color, in fact they form the coloring matter of these limestones, and its presence does not seem to interfere, by any means, with the usefulness of the stone in lithographic art. It might be even presumed that the presence of this partially destroyed animal matter may have had some influence on the peculiar precipitation, and, under great pressure, on the fine and even formation of these peculiar strata. The material collected by me and the work done so far does not justify a final conclusion; but it is probably sufficiently strong to indicate it, and may give an idea for practical tests; in all other respects, with the exception of some stones containing too much siliceous matter, the composition varies but little, and the differences are not pronounced enough to impair the quality of the stone for lithographic purposes.

Whatever the influence may have been of this organic matter on the precipitation of calcium carbonate—holding this and other inorganic substances in suspension, retarding quick precipitation and thereby assisting in the formation of even grained and dense strata under subsequent pressure, it may be conceded that lithographic stone was formed during or after the destruction of a large and peculiar fauna, like the jurassic and silurian limestone periods; and if further analytical work should confirm what my present investigation seems to indicate, that this peculiar coloring matter is an essential feature of good lithographic stone, an identification of the proper material in the original deposits would thereby be greatly facilitated.

Dr. C. W. Volney.

MIRACLES IN MARBLE.

UNTIL I came to India I did not at all understand the artistic beauty of marble. On the stage I may have heard some mendacious Claude Melnotte gush forth a tirade of mellifluous nonsense about "a palace lifting to eternal summer its marble walls." In the drawing-room, inspired by Balfe and the poet Burns many and many a throaty tenor or sweet-toned soprano may have induced me to believe that they "dreamt that they dwelt in marble halls, with vassals and serfs by their si-i-i-ide!" Somewhere or other in our smoke-haunted country we may come across the remains of what was once a marble monument. Even in London we have St. Paul's Cathedral and the Marble Arch, but they require a considerable amount of soap-and-water before we can conscientiously believe that they were ever white at all. But such as these do not come within measurable distance of the unknown men of past ages, be they Mahomedan, Hindoo, or Florentine, who worked for the India that existed before and after Christ, and who have left their imperishable and lovely records on the old walled cities of Delhi, and Agra, and Jeypore. I repeat it, except in India marble has never been seen. To its pure heart and to its very veins they can apply every color and jewel that can be found in broken rainbows or precious tints. Into the fair body of the Indian marble they can work designs and arabesques borrowed from the Persia of ancient history, and flowers of exquisite hue and symmetry suggested by the more advanced and civilized Florentine artists, who were tempted over by the well-filled coffers of Shah Jehan. I find that the best-informed writers on architecture wrangle and cavil about the beauty or imperfection of this or that design in mosque or tomb. But this I will affirm, that those who as yet have not stood in delighted admiration of the lace-work palaces, the jeweled baths, and the mirrored zenanas of old-world Delhi; that such as have as yet to ride on an elephant to Jeypore to visit the palace of ancient Amber on the tree-crowned hill; that those who have not entered the mighty fortified gates of the Agra Fort; that the ill-starred ones who have not stood transfixed before the milk-white terrace and facade of the Pearl Mosque; and, lastly, that the eyes that have not seen and the imagination that has not been transfixed by the miracle of virgin loveliness the Taj Mahal, at Agra, have not beheld the architectural wonders of the world.

It was only late last summer, before the roses and lemon-scented verbenas were quite dead, that, sitting in a Regent's Park garden under the "dream-

ing garden trees," a dear friend tried to explain to me the glories of and the poetic imaginings surrounding the Taj Mahal. But no mere photograph, no chance description or rhapsody can convey any idea of the consummate grace, and transcendent beauty, or matchless purity of this marvelous monument. The idea of the structure and the cause that gave it to an admiring world are, no doubt, beautiful enough, but the reality transcends the idea—the result exceeds the ideal. You know, perhaps, that in the India of old times it was the custom to turn a lordly dwelling-house into a still more costly tomb. Where a man had lived, there he would rest. Where he had feasted, there he would repose until the end of time. Where his friends had assembled to break bread with him, there they were to come to stand and admire her embellished tomb. "What is this?" I ask, as the carriage suddenly stops before a marble gateway, a flight of marble steps, a marble court-yard, a marble hall, countless marble minarets, and a marble vault—another tomb! They are all the same shape, nearly all of the same design, some of marble alone, some of marble mixed with red sandstone; some of excellent, many of inferior design; but when once you have seen one you have, to a certain extent, seen all and been convinced what pride the departed took in advertising to posterity their wealth and grandeur. Where a man lived there he was buried; where he entertained there he was mourned; the home of revelry was turned into the home of silence. But it was a more beautiful idea still that inspired the Emperor Shah Jehan when he determined, in the year 1630, to dedicate to Love, and Love alone, the most costly and wonderful palace that the world has ever known or seen. On the marble front of the Taj Mahal, in jeweled letters might be written, "Love is mightier than Death." And this was the theory of the Emperor Shah Jehan. Loving one woman beyond all rubies, considering her memory to be priceless, so did he determine to erect to her eternal honor a marble and costly tomb that should speak of his adored consort beyond the centuries.

"As my wife," quoth the Emperor Shah Jehan, "was the loveliest and most priceless among women, so shall her tomb be the most priceless and wonderful in the world;" and thus it has proved. But the wife of the Emperor Shah Jehan, this "pearl beyond price," had no house of revelry that could be turned into a resting place of love. But she had a garden of roses and lilies by the side of the sacred Jumna river, a garden that looked across to the fort and palaces of Agra, a garden most dear to the emperor and his beloved wife; and here, in this garden, the sorrow-stricken husband determined to build in marble, and to inlay with precious stones, the costliest and most beautiful tomb that imagination could conceive or wealth purchase dedicated to conjugal Love! Solomon in all his glory had no such ideas of magnificence as the Emperor Shah Jehan. Thousands and thousands of workmen were compelled to construct and a Florentine artist hired to de-

sign; and even then the Taj Mahal was only to be the beginning of a far vaster and more costly scheme, that included another tomb for the husband across the river, annexed to the wife's by a silver bridge. But fate and circumstances decreed that this should not be, so in the Taj Mahal rest side by side these married lovers under a canopy that is the admiration of the whole civilized world.

I have arrived at Agra, and the old impatient feeling comes over me that I must rush out and see its priceless treasure at once, or it will be too late. I have not forgotten the conversation in the rose garden of the Regent's Park, and even yet something may happen, some catastrophe may occur, to blot out the lovely Taj Mahal from my eager eyes. I remember once escorting a party of dear friends to see the grand square of St. Mark's at Venice by moonlight, and found to my horror that the priceless piazza was inclosed by a boarding, for they were repairing the pavement. What a terrible thing it would be if, after these thousands of journeying miles, the sun should disappear and the rain pour down in torrents; for it does rain at Agra. Think if the white marble Taj should be enshrouded in a fog; for I have encountered pea-soup fogs in India. Think if neither the sun nor moon, by day or night, were allowed to illumine with new beauty this tomb of the old-world lovers. The desire to take a carriage and rush off to the Taj was irresistible. The lordly hospitality of modern India awaited me. My name was already down at the cozy home of congenial Englishmen, dear to the lonely wanderer—the Agra Club. A corner in his tent had been prepared for me by the son of my dear old friend and fellow-worker, Sir Douglas Straight, a popular "boy" indeed out in India, who the other day captured, single-handed, a whole house-full of desperate and murderous Dacoits, covering himself with glory.

The impulse aforesaid persuaded me to press on to the Taj whilst the sun was burning in the heavens. I might not have another chance again. I was to see one of the wonders of the world. The lovely garden that contains this radiant tomb is approached with all due solemnity of architectural device. You leave the wide Indian road planted with bungalows and hotels and English institutions, and you drive up an imposing courtyard or quadrangle of worn red sandstone, and then the carriage stops at the marble steps of the decorated marble gateway. The multi-colored and polychromatic gateway is enough to take your breath away. You may have seen before flower and arabesque designs applied in color upon flawless marble. But here it is on a stupendous size. The lofty and imposing gateway is a fair warning of the beauty to come. On I go awestruck through the deep recesses of this mysterious arch, until all at once there bursts upon me the most marvelous sight my eyes have ever seen. Picture to yourself, in the full noonday sunshine, a garden that brings fairyland home to the eyes. No

dream of Arabian Nights, no romance of such lovers as Camaralzaman and Badoura, no chapter in fanciful or imaginative fiction ever distanced the reality of the garden of the Taj on the day that I saw it. An oblong, sweet-scented, leafy, rose-girt garden, borrowed from dreamland. Straight from the gateway to the tomb of tombs runs a basin of sweet water incased in marble. On either side of the pure water, disturbed only by the plash of many fountains, runs a double avenue of dark Italian Cyprus. The air is perfumed with flower-scents. Lemon and rose battle for supremacy. Everywhere there is color, but color of the softest and the tenderest in the world. The pale blue of the cloudless Indian sky, the crimson and light gold of the roses, the deep mauve and light purple of the clambering bougainvillia form a cluster, as it were, a flower garland of leaf and bloom and bud, at the base of this most marvelous white monument that stands in literally spotless grandeur, defying color with its absolute alabaster purity.

Surely, if the Taj is white, then white is indeed a color. Basking, as it does, in the full noontide sun, this mass of virgin marble assumes an indescribable sheen—I can find no other word—the sheen or gloss or glow that the ancients described as “*purpureus*.” It is the sheen or gloss or velvety surface that we find on a white garden lily, or on the back of a white swan pluming his feathers in the sun on some reach or backwater of our own Thames at home. If the Latin poets in their fancy called such a white swan “*purpureus color*,” they would similarly describe the Taj as “*marmor purpureus*.” For it is marble that assumes color by means of the glory of its perfect purity. The effect upon the mind of this consummate loveliness is extremely fascinating. Remember I am describing it at noonday, when the white marble is invested with a glow of gold. The sight before you is so majestic that the instinct is almost fear to approach it. For a good hour I wandered round this tomb, speechless with admiration, afraid, as it were, to enter. I sat on the marble bench raised on a dias in the center of the narrow platform among the fountains and the flowers, and looked until my eyes ached with the hot glare of the sun-kissed marble. I mounted the marble steps that lead to the marble platform overlooking the flowing Jumna. I took in, as far as I could, the colored texts from the Koran inlaid into the marble, and the exquisite designs and flower patterns that gave the added beauty of color to this mass of virgin white. And then I entered.

Here all description fails me, unless words can paint the marble made into delicate lace-work by exquisite carving; the screen of marble as light as gossamer; the tomb of white marble incrustated with the most priceless marbles in the world, and studded with uncounted jewels. It grows upon you. You cannot talk, or discuss anything. You want to be alone and to be left alone. The chatter of the guide-book sight-seers jar upon your nerves. You go out and come in, you walk round and round about, and when you regretfully leave the tomb of tombs, it is never with your back

turned against it. But you must come again later on in the day, when the sun is setting and the summer garden is bathed in calm and drowsiness, and all the blues and purples and oranges and golds of the broken rainbow of the sun are shed upon the marble that glows in the last glory of the summer evening. But, best of all, you must come for the third time, as I did, alone, at midnight, when the color is all spent, and the Taj, transformed into a peerless lily, stands erect in the garden to receive the cold embraces of the moon. Yes, come alone, unless your companion is very near and very dear. Do not let anything jar against this melody of night. Thus alone, I wandered, in the moon-lit garden. Thus alone, I sat where the fountains played in the silence, watching the marble still in glow and glory of white. Thus, alone, I entered where the red lamp burns over the tomb of the lovers, never divided by death.

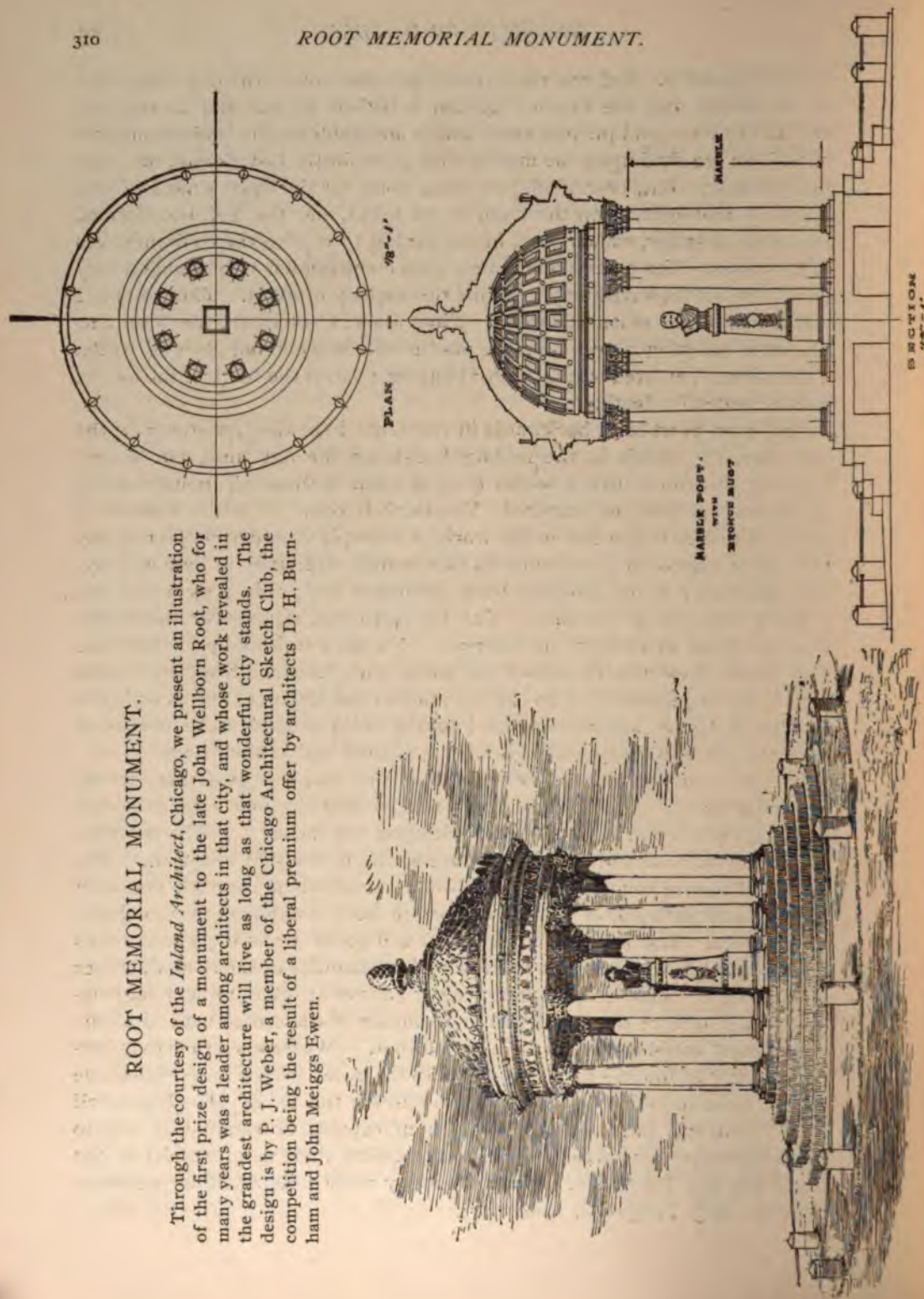
And now, as walking backwards in reverence I see the Love-tomb for the last time, and watch in the midnight distance the red lamp, like a star, burning over those united bodies deep in earth, is there no thought more; no impression still unrecorded? Yes, there is one. It is the wonder of wonders that nowhere else in the world is a temple vowed to religion of any kind to be compared in splendor to this temple dedicated to human Love. For, remember, it is a beautiful body without a soul; it is a memorial, not a place of prayer or sacrifice. The red lamp that burns over the tombs does not point to an altar, but a shrine. No one kneels and no prayers are said under these marble domes incrusting with jewels. Nowhere in the world, not in Jerusalem or on Calvary, not on the Mount of Olives or in the Garden of Agony, has money been found to build a temple to be compared with this priceless memorial of human sympathy and abiding Love.

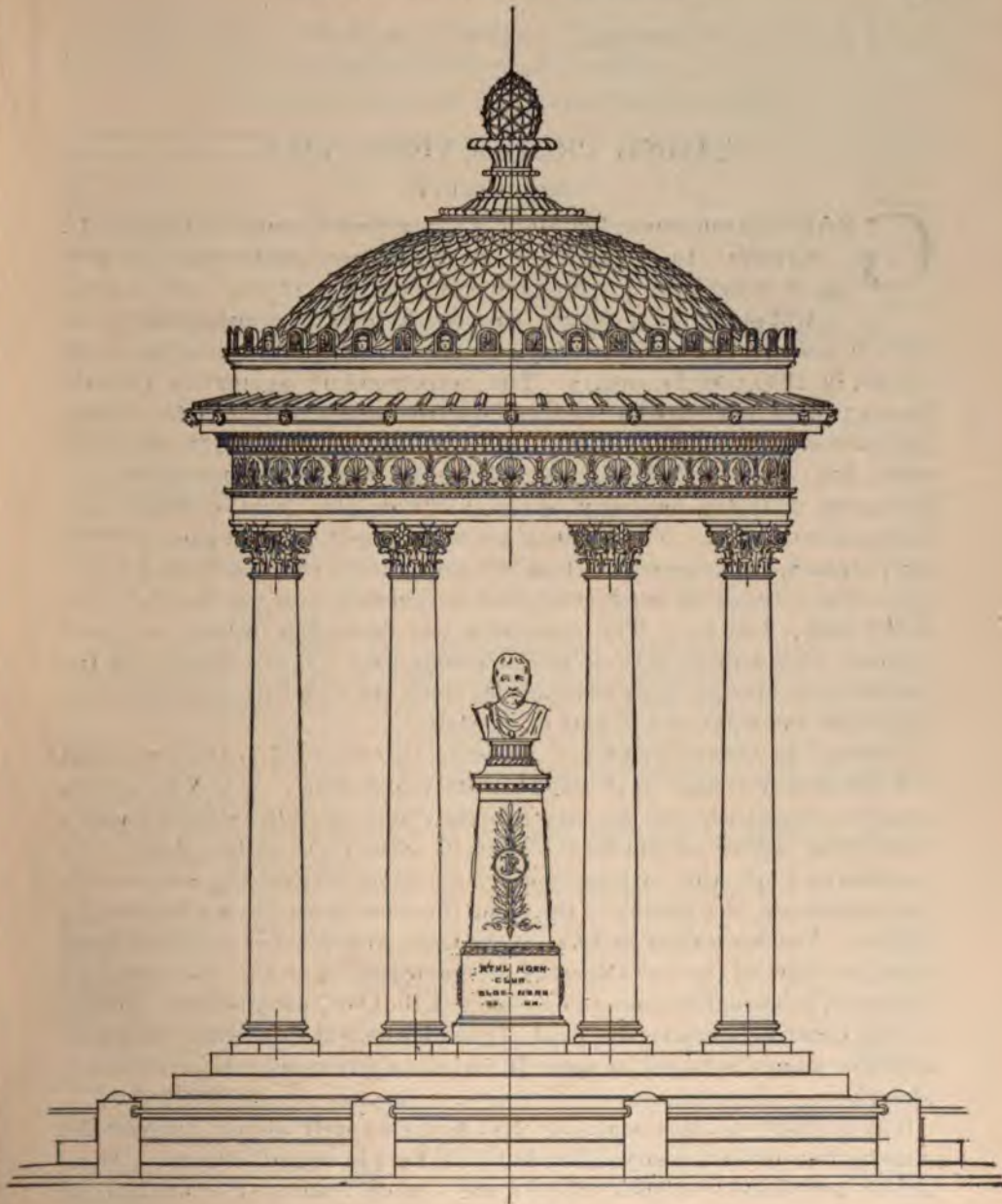
It is well, indeed, to have seen it, and in this case the result far exceeds the expectancy. Never before has a temple made by man's hands so fed the imagination and so impressed itself upon the memory. The architect will take you aside and tell you you are wrong to think it beautiful. The artist will assure you that your eyes are deceived when they tell you such designs and such colors have never before been combined in a majestic masterpiece. The untamable vulgarian will go on whistling comic songs in these gardens of cypress and bellowing his banalities in the Echo Chamber of the tomb. Some exceptionally clever person or other, hungry for originality, will declare that "She was so dreadfully disappointed with the Taj; and, indeed, could not see anything at all in it." Worse even than that, barbarians will be found—for I discovered these graceless creatures—who have visited Agra and never taken the trouble to see the Taj at all. But for all that, I shall still maintain that to the mind capable of imagination and to the temperament amenable to poetic impression there is no wonder in the world like the Taj Mahal. It is artistic joy made a living thing.—*Clement Scott, in Daily Telegraph, London.*

ROOT MEMORIAL MONUMENT.

ROOT MEMORIAL MONUMENT.

Through the courtesy of the *Inland Architect*, Chicago, we present an illustration of the first prize design of a monument to the late John Wellborn Root, who for many years was a leader among architects in that city, and whose work revealed in the grandest architecture will live as long as that wonderful city stands. The design is by P. J. Weber, a member of the Chicago Architectural Sketch Club, the competition being the result of a liberal premium offer by architects D. H. Burnham and John Meiggs Ewen.





-ELEVATION-

SCALE 1/2 INCH = 1 FOOT.

STONE PRODUCTION—VII.*

MASSACHUSETTS.

GRANITE, sandstone, limestone, and marble are produced in this state.

Granite.—In the granite industry Massachusetts stood in first place among the granite-producing states in 1880 as well as 1889.

It will moreover, probably continue to hold this position for some years to come. The value of the granite output, according to the tenth census, in 1880 was \$1,329,315. The corresponding figures for 1889 are \$2,503,503. There were in 1889, 151 quarries, distributed over the following counties, named in order of value of product: Essex, \$778,366; Worcester, \$751,413; Norfolk, \$485,353; Middlesex, \$172,161; Bristol, \$164,337; Hampden, \$112,849, and very small quantities also from Franklin and Hampshire counties. The product was most largely used for general building purposes, the value of the stone devoted to those purposes being \$1,362,451. The value of the product devoted to cemetery uses was \$497,438; for street work, \$466,147. The remainder was devoted to bridge, dam, and railroad work, and to various miscellaneous uses. It is evident that the granite comes mainly from the counties along the eastern coast and principally from the northeastern part of the state.

Among the various granites of the state, that quarried at Quincy, which is a bluish-gray syenite, is perhaps the most interesting. It was the first to acquire a reputation, and the success of the Quincy granite did much towards stimulating search for similar products in other parts of the state. The quarries on Cape Ann, in Essex county, are being very rapidly and successfully developed, the quality of the stone produced here leaving little to be desired. Transportation facilities at the Cape Ann quarries could hardly be better, in view of the fact that they are immediately on the coast and, furthermore, in immediate communication with the Old Colony railroad. There is still, however, considerable need of good harbors at this locality, and considerable money must yet be spent there before quarrying can increase as it should.

The products of Massachusetts granite are so well known all over the country that it is necessary to say but little here in regard to them. Stone for all purposes is shipped all over the United States. The methods of quarrying and of cutting and polishing the stone in vogue in this state are fully up to date.

*Report of United States Geological Survey for 1889-90.

The following is an analysis of Bradford red granite, made by L. P. Kinnicutt, Ph. D., of the Worcester Polytechnic Institute.

ANALYSIS OF BRADFORD, MASSACHUSETTS, RED GRANITE.

	<i>Per cent.</i>
Silica.....	72.73
Alumina and oxide of iron.....	16.95
Lime.....	1.05
Magnesia.....	trace.
Potassium oxide.....	8.15
Sodium oxide.....	.90
Loss and undetermined.....	.22
Total.....	100.00

The following is an analysis of Worcester granite. The analysis was made by Prof. C. F. Chandler, of New York.

ANALYSIS OF WORCESTER, MASSACHUSETTS, GRANITE.

	<i>Per cent.</i>
Silica.....	76.07
Alumina.....	12.67
Iron peroxide.....	2.00
Manganese oxide.....	.03
Lime.....	.85
Magnesia.....	.10
Potash.....	4.71
Soda.....	3.37
Total.....	99.80

Sandstone.—Sandstone was produced from twenty-one quarries, to an amount valued at \$649,097. The most important county is Hampden, in which the product was valued at \$563,179. Suffolk county produced an amount valued at \$82,018, while very small amounts came from Norfolk and Hampshire counties. The product is almost entirely used for general building purposes.

The following is an analysis of so-called Maynard sandstone, made by Dr. L. P. Kinnicutt.

ANALYSIS OF MAYNARD, MASSACHUSETTS, SANDSTONE.

	<i>Per cent.</i>
Silica.....	79.38
Oxide of iron.....	2.43
Alumina.....	8.75
Lime.....	2.57
Soda and potassa.....	4.08
Carbonic acid, water, and loss.....	2.79

Total..... 100.00

The following is an analysis of Worcester sandstone, made by Dr. L. P. Kinnicutt.

ANALYSIS OF WORCESTER, MASSACHUSETTS, SANDSTONE.

	<i>Per cent.</i>
Silica.....	88.89
Alumina.....	5.95
Iron oxide.....	1.79
Manganese dioxide.....	.41
Lime.....	.27
Potassa and soda.....	.86
Carbonic acid, water, and loss.....	1.83
Total.....	100.00

The following is an analysis of Kibbe quartz sandstone, made by Prof. C. F. Chandler, of New York.

ANALYSIS OF KIBBE, MASSACHUSETTS, QUARTZ SANDSTONE.

	Per cent.
Silica.....	81.38
Alumina.....	9.44
Oxide of iron.....	3.54
Lime.....	.76
Oxide of manganese.....	.11
Magnesia.....	.28
Carbonic acid, water, and loss.....	4.49
Total.....	100.00

Limestone.—The limestone of Massachusetts comes from twelve quarries in Berkshire county, in the western part of the state. The total product in 1889 was valued at \$119,978. Most of it was used for burning into lime. The remainder was devoted to building purposes and flux.

The following is an analysis of limestone from Berkshire county:

ANALYSIS OF BERKSHIRE COUNTY, MASSACHUSETTS, LIMESTONE.

	Per cent.
Lime.....	95.66
Magnesia.....	.76
Oxide of iron and alumina.....	.17
Silica.....	1.14
Carbonic acid.....	None.
Loss at red heat (water).....	3.00
Total.....	100.73

Marble.—Marble was produced in small amount at Lee, Berkshire county.

MICHIGAN.

In 1889 sandstone, limestone, and slate were produced in this state.

Sandstone.—This was valued at \$246,570. By far the most important producing county is Houghton, which yielded a product valued at \$165,000. Marquette county, with a product valued at \$35,970 stood second, while smaller amounts were produced in Huron, Ionia, Ottawa and Hillsdale counties. Most of the product was used for building purposes, although it is important to note that \$27,800 worth were used for abrasive purposes, Michigan being one of the three or four states producing good abrasive material.

Limestone.—Limestone valued at a total of \$85,952 was produced in the following counties, named in order of their importance: Huron, \$40,272; Wayne, \$16,715; Emmet, \$13,100; and smaller amounts from Monroe, Delta and Alpena counties. Most of the product was used for building purposes, although some was burned into lime, and a slightly larger quantity used for street work, the rest being devoted for fluxing uses.

Slate.—The value of the slate produced in Baraga county was \$15,000.

Marble.—Marble has been discovered at Ishpeming, Marquette county, and is said to be of very fine quality, even comparing favorably with the American onyx. It must be said, however, that no full and definite information is yet at hand in regard to this discovery.

William C. Day.

BUSINESS OF THE WESTERN STONE CO. LAST YEAR.

THE annual meeting of the Western Stone company stockholders was held at the company's offices in Chicago, Jan. 18. The board of Directors, consisting of J. H. Dwight, L. C. Huck, Frederick T. Haskell, C. L. Hutchinson, E. A. Hamill, C. B. Kimbell, M. B. Madden, B. J. Moore, J. L. Norton, D. V. Purington, and C. H. Wacker, were unanimously elected, the total vote being 14,626 shares. C. B. Kimbell desired to withdraw from the directory on account of ill-health, but the stockholders were unanimous in their desire that he continue on the board, and he finally agreed to accept a reelection. President Moore's report showed the result of the year's business to be as follows:

GENERAL STATEMENT			
Sales		\$1,312,411	
Expenses		1,100,802	
Net earnings		\$ 211,608	
Or about 9½ per cent. of the capital.			
Dividends		\$ 175,000	
Leaving a surplus of		\$ 36,608	
RESOURCES.			
Real estate and buildings		\$2,326,808	
Tools and machinery			
Horses and wagons }		534,549	
Boats			
Merchandise		\$346,924	\$3,208,281
Bills and acc'ts received }			
LIABILITIES.			
Capital stock		\$2,250,000	
Bonded debt		577,000	
Mortgage debt		99,000	
Bills and accounts payable		145,316	3,071,316
Surplus			\$ 136,965

The president's report was essentially as follows:

"Owing to the fact that with the year just passed the company acquired large additional equipments in the purchase of the properties of the Joliet Stone company and the Crescent Stone company, and that it has consequently been working under different conditions, it is impossible to make any comparison of the year with that of the year previous. The year has been exceptional for floods. During the entire months of May and June and a part of July the flooding of the quarries was unprecedented, costing us at least \$20,000. We were obliged to pump at all the quarries unceasingly days, nights, and Sundays, many of the quarries being at times completely under water. A great amount of labor was required in strengthening our embankments and in removing the deposits of the flood, some of

the deposits having been fifteen feet deep, covering the quarry faces completely. This in no small degree retarded the progress of our business for weeks, curtailing in a large measure our production and consequently our sales, at the same time adding largely to our expenses. During the latter part of the season we have been in receipt of fair selling prices, but in the early part of the year, owing to sharp competition, we were selling at quite low prices, which cut down in some measure our profits. We feel that the acquisition of the Joliet properties has worked to our advantage in that it has given us large facilities for our business which we have not failed to use, as may be seen from the fact that in the year 1892 we have increased our car shipments by over 8,000 cars. These results have been attained not by decreasing our canal shipments, for during the year we have increased our canal shipments by 529 boatloads. The number of employes during the year has averaged 1,547. During the coming year leases to two river docks, which we acquired in our purchases, expire, and thereby relieve us of an annual expense of about \$10,000 for rent without curtailing our facilities for handling the business. We have added to the working and labor-saving facilities of the company a steam traveling crane and tramway at Joliet, a floating steam derrick for the unloading of boats in the river and lake away from our yards, and a new canal-boat, together with some few other betterments, of \$22,000. We feel that the results of the operation of this machinery has been a handsome saving on the stone handled."

Director Purington desired that the stockholders be furnished with a printed statement showing in detail the financial position of the company, and he made a motion instructing the president to have printed and mailed to each stockholder such a statement. The motion was unanimously adopted. After the adjournment of the meeting, the directors met and reelected the old officers, consisting of B. J. Moore, president; M. B. Madden, vice-president; E. A. Hamill, treasurer; and H. L. Draper, secretary.

THE NEW HOME OF THE MINNEAPOLIS CONTRACTORS AND BUILDERS.

ORTONVILLE granite bases are used for all piers. The construction used in the building is similar to that used in the tall office buildings of Chicago and elsewhere. Z-bar columns are built in all outside piers and support the ends of steel floor beams; no weight being carried by the brick work. The floors are constructed of hollow tile arches sprung between the steel floor beams. Z-bar columns are used throughout the building for supports. Three passenger elevators are situated in the center of the building just behind the main entrance. The building will be lighted and heated by its own plant. The building is 155 feet long and 66

feet deep, ten stories high as designed. It will be used as an office building for milling concerns, contractors and builders, etc. Location, corner of Fourth avenue South and Third streets, Minneapolis, Minn. Wm. H. Eustis, mayor of Minneapolis, owner. Long & Kees, architects.





A MODEL MARBLE MILL.

THE above illustration shows the exterior of a marble mill designed and built in iron and steel for the True Blue Marble Company, at Rutland, Vt. During the winter of 1891, the entire plant of the True Blue Marble Company was destroyed by fire. Their old mill was 80 feet in width and about 200 feet in length, although they had just made arrangements and had in the foundation for a 50-foot extension, when fire came and destroyed the entire plant. The loss was severe as the mill and machinery was completely destroyed, but the loss of time on account of loss in business and the delay in filling orders was even greater than the loss of the plant. It was determined to rebuild the mill in such a way as to prevent a recurrence of a calamity of this kind. They placed the contract with the



Berlin Iron Bridge Company of East Berlin, Conn., and through their courtesy we are able to illustrate in this number the construction of the new mill, both exterior and interior. The new mill is 80 feet in width and 254 feet in length. The lower portion for a distance of about 10 feet from the ground is made of marble, and above that the entire construction is of iron.

The side posts extend through the marble portion of the side walls and rest on the foundation walls, the marble blocks being placed between these posts. The sides and roof are covered with corrugated iron and, in order to eliminate entirely the danger from fire, no wood is used about the construction of the mill, even in the interior. Owing to the peculiar construction of a marble mill the strains are very severe, and unless a mill is very heavily timbered there is more or less motion to it when all the saws are operating at one and the same time. The new mill of the True Blue Marble Company, illustrated herewith, is remarkable on account of its extreme stiffness and rigidity, even when all the saws are operating, and it is probably, without exception, the best stone mill in the world. The True Blue Marble Company carry no insurance whatever on this plant, as there is no danger whatever from fire. Five cords of wood put right in the center of the building and fired would produce no damage except to the paint on the iron work and, under these circumstances, it is absolutely unnecessary to carry any insurance. The construction particularly commends itself to other corporations, as the late advance in insurance rates on marble mills has been a severe burden to owners.

THE LORAIN STONE COMPANY.

A ST. CLAIR, Mich., newspaper has the following: "A quiet but important meeting was held at the office of C. McElroy, on Saturday last, and a company called 'The Lorain Stone Company' with a capital of \$100,000 was organized. The officers of the company are C. McElroy, of this city, president; J. B. Moore of Lapeer, vice-president; Frank McElroy of Marine City, secretary and treasurer. The company will engage in the business of quarrying the celebrated Amherst sandstone in Lorain county, Ohio. The main office of the company will be located in Lorain, a prosperous village of about 6,000 inhabitants on the south shore of Lake Erie, twenty-five miles from Cleveland. At this place the company has purchased a fine property of 250 acres about sixty acres of which are newly discovered stone lands and seventeen acres are laid out in city lots. The company has also secured fifty acres of stone land at Amherst in the center of what is claimed to be the largest and finest deposit of blue sandstone in the United States. The area of this deposit is only about 300 acres, but after a few feet of strippings at the surface, good stone is reached and extends to a depth of more than 100 feet, one quarry having reached a depth of 120 feet and still has good stone at the bottom. The great depth of this deposit and the superior quality of the stone makes each acre of the land that has been proved by boring test holes with a core drill, to have a depth of eighty feet or more of good stone, worth a large sum of money. One of the quarries

at this locality has been in operation twenty-five years, and the excavation is said to be the largest artificial hole that has been made into the face of the earth, and still the opening is only about five acres in extent.

"Amherst stone is shipped to nearly every state in the union and to Canada. The consumption is very large and increases rapidly. It is used for foundations and trimmings for brick houses, curbstones, flag-stones, grindstones, and many of the finest public buildings in the country are built with it. The Michigan office of The Lorain Stone Company, will be at the office of C. McElroy in this city."

FOR HOME INDUSTRY.

The following documents are self-explanatory:

DENVER, COLO., Feb. 14, 1893.

To the Congress of the United States:

WHEREAS, We, the directors of the Colorado Marble and Mining Company, having learned that in the recent letting of contracts for marble required for the interior finishing of the congressional library at Washington foreign stone to the amount of \$600,700 was required and only \$38,600 worth of native product allowed to compete for acceptance by Architect Green and General Casey, chief of engineers, and

WHEREAS, In view of the fact that this country can furnish stone and marble of superior quality and appearance, and in any quantity and required dimensions, at equal prices, the discrimination in favor of foreign stone is unjust and inconsistent with the performance of duties and exercise of patriotism expected of government officials, and

WHEREAS, By this practically complete exclusion from the privilege of competing for the furnishing of material for a national building, the industry is injured by an implied judgment that the home product is inferior to the foreign,

Now, therefore, the quarrymen of marble in Colorado, on behalf of themselves and other marble producers of the United States of America, respectfully present a claim of unjust treatment in the matter of the specifications for the congressional library at Washington.

We assert, and pledge ourselves to prove such assertion before any commission of experts, or committee appointed by Congress, that this country can promptly furnish decorative stone and marble for all interior finishing, equal to or superior to that furnished from any foreign quarry; and we respectfully but earnestly protest against the use of foreign marble or stone in the finishing of a United States government building, when a superior home product could have been obtained at equal prices, had fair and open competition been admitted.

Exercising a constitutional right, we respectfully petition that a constitutional committee of inquiry be appointed to ascertain the reason, if such exist, for the exclusion of American quarrymen from the privilege of bidding upon contracts for material to be used in an American public building; and furthermore, respectfully petition that congress be requested by proper resolution, to require that an equal chance for competition be given to the product of American quarries, when equal to the foreign, and entering into the materials for buildings erected by the United States.

Resolved, That the secretary present a copy of these resolutions to the Chamber of Commerce and the various exchanges of Denver for their indorsement.

Joseph Cresswell, M. J. McMamara, W. H. Morrill, M. M. Van Fleet, W. P. Macon, H. M. Jorlman, S. W. Keene.

The above resolutions were indorsed by the Chamber of Commerce and Board of Trade, the Real Estate and Stock Exchange, the Manufacturers' Exchange and the Mining Stock Exchange, all of Denver, in strong resolutions.

THE CONVENTIONS.

THE ALLEGHENY ASSOCIATION.

THE third annual convention of the Allegheny County Cut-Stone Contractors' and Quarrymen's Association took place Tuesday, February 14 in parlor "A" of the Hotel Duquesne, Pittsburgh, Pa. The roll call was responded to by the following members:

Quarry Owners—George A. Baillee, Berlin Heights, O.; Buckeye Stone Co., St. James, O.; Buente & Martin, Pittsburgh, Pa.; S. Caspari & Co., Pittsburgh, Pa.; Cleveland Stone Co., Cleveland, O.; J. S. Coxey, Massillon, O.; Elyria Stone Co., Elyria, O.; Forest City Stone Co., Cleveland, O.; Furst, Jacobs & Co., Chicago, Ill.; Grafton Stone Co., Grafton, O.; Joseph Hartman & Sons, Pittsburgh, Pa.; J. P. & R. H. Knox, Pittsburgh, Pa.; A. Kreps, Millrock, O.; Reese Lindsay & Co., Pittsburgh, Pa.; Malone Stone Co., Cleveland, O.; Maxwell Blue Stone Co., Cleveland, O.; Maxwell & Rolfe, Cleveland, O.; Ohio Stone Co., Cleveland, O.; Park & Park, Freedom, Pa.; Perry, Matthews & Buskirk, Bedford, Ind.; Portage Red Stone Co., Chicago, Ill.; Potsdam Red Sandstone Co., Potsdam, N. Y.; Reitz & Co., Portsmouth, O.; John Ronigh, Freedom, Pa.; Sawn & Robinson, East Longmeadow, Mass.; Walkers Mills Stone Co., Walkers Mills, Pa.

Contractors—Rudolph Ably, Pittsburgh, Pa.; Wm. Aitkenhead, Allegheny, Pa.; A. Alston & Co., Allegheny, Pa.; Gotlieb Anger, Pittsburgh, Pa.; George A. Becker & Son, Pittsburgh, Pa.; A. Beggs & Son, Allegheny, Pa.; Joseph Bock, Pittsburgh, Pa.; Buente & Martin, Pittsburgh, Pa.; Clark Bros., Allegheny, Pa.; James Cummings, Allegheny, Pa.; Erbeck Bros., Homestead, Pa.; Fred. Flagge & Co., Pittsburgh, Pa.; Greb & Hinnebusch, Pittsburgh, Pa.; George Hogg, Braddock, Pa.; Huckenstein & Co., Allegheny, Pa.; Kaiser & Stehle, Pittsburgh, Pa.; J. P. & R. H. Knox, Allegheny, Pa.; Kunkle & Jordan, Allegheny, Pa.; Reese Lindsay & Co., Pittsburgh, Pa.; McDonald Bros., Pittsburgh, Pa.; McMahon & Gray, Pittsburgh, Pa.; P. Murray & Bro., Pittsburgh, Pa.; John Schreiner, Allegheny, Pa.; Joseph Shallenberg, Pittsburgh, Pa.; A. Stehle, Allegheny, Pa.; Valentine & Berg, Allegheny, Pa.; Werner & Sweitzer, Pittsburgh, Pa.

The minutes of the previous meeting were read and approved.

Secretary Buente made the following report of the association's financial condition:

Total receipts	\$2,809 56
Balance February 9th	2,637 29
	<hr/>
	\$5,446 85
Expenditures	1,725 05
	<hr/>
	\$3,721 80

Amendments to the Constitution and By-Laws were proposed as follows:

ARTICLE IX.—BY-LAWS.

SECTION 2. All cut-stone work used for building purposes, excepting granite and marble, and including flagging, except such of three inches thick and under, shall be considered cut-stone work for building purposes, within the meaning of the constitution, and under its jurisdiction.

THE CONVENTIONS.

AMENDMENT.

SEC. 2. All cut-stone used for building purposes, excepting granite and marble, shall be considered cut-stone work, within the meaning of this constitution, and under its jurisdiction.

(Signed)

JOSEPH SHALLENBERGER,
JOSEPH BOCK,
JOHN SHREINER.

PITTSBURGH, PA., February 9, 1892.

Withdrawn.

ARTICLE IX.—BY-LAWS.

SECTION 2. All cut-stone work used for building purposes, excepting granite and marble, and including flagging, except such of three inches thick and under, shall be considered cut-stone work for building purposes, within the meaning of the constitution, and under its jurisdiction.

AMENDMENT.

SEC. 2. All cut-stone work used for building purposes, excepting granite and marble, and including flagging, shall be considered cut-stone work, within the meaning of the constitution, and under its jurisdiction.

(Signed)

JOSEPH BOCK,
PATRICK MURRAY & BRO.,
THE MALONE STONE CO.,
per C. O. MALONE, Vice-President.

PITTSBURGH, PA., January 20, 1893.

Lost.

ARTICLE V.—CONSTITUTION.

The constitution or by-laws can be amended at any regular meeting, by a two-thirds vote of the entire membership. Any proposed amendment to the constitution, signed by three members, shall be submitted to the secretary, at least two weeks previous to the meeting at which it shall be acted upon; and it shall thereupon be the duty of the secretary to send a written or printed copy of same to each member.

AMENDMENT.

The constitution or by-laws can be amended at any regular meeting, by a two-thirds vote of the members present. Any proposed amendment to the constitution, signed by three members, shall be submitted to the secretary, at least two weeks previous to the meeting at which it shall be acted upon; and it shall thereupon be the duty of the secretary to send a written or printed copy of same to each member.

(Signed)

J. P. & E. A. KNOX,
BUENTE & MARTIN,
REESE LINDSAY & CO.

PITTSBURGH, PA., September 13, 1892.

Passed.

ARTICLE IV.—BY-LAWS.

SECTION 2. The dues shall be \$10.00 annually, to be paid semi-annually in advance.

AMENDMENT.

SEC. 2. The dues shall be \$5.00 annually, to be paid in advance.

(Signed)

JOSEPH BOCK,
PATRICK MURRAY & BRO.,
THE MALONE STONE CO.,
per C. O. MALONE, Vice-President.

PITTSBURGH, PA., January 20, 1893.

Lost.

Additional proposed amendments were offered as follows:

WHEREAS, It is to the mutual advantage of all members of this association that the prices of all block and sawed stone shall be uniform throughout; and

WHEREAS, To this end it is necessary that there be submitted to the association a list of prices for all classes of stone used by the contractors; therefore,

Resolved, That the by-laws of our association be and are hereby amended by adding thereto

ARTICLE XII,

as follows:

"All quarrymen that are members of this association shall, at the annual meeting held each year, submit a complete list of prices; said prices on any one variety of stone to be uniform and to remain in force for one year, or until the holding of the next annual meeting.

"And it shall be the duty of the secretary of this association to have printed price-lists distributed to all contractors that are members.

"Furthermore, that in the event of any quarryman furnishing any stone or taking any order for stone from any contracting member at less than the regular prices, said quarryman shall be fined for such offense the sum of twenty-five (25) cents per cubic foot for each cubic foot of stone so sold or furnished; and such fine shall be imposed by the executive committee, and when collected by the secretary, shall become a part of the general fund."

(Sinned)

THE MALONE STONE CO.,
W. S. Norris, Sec'y,
MAXWELL, ROLF & CO.,
FOREST CITY STONE CO.,
JOHN HOLLAND.

Moved that it be laid on the table. Carried.

ARTICLE VII.—BY-LAWS.

SECTION 5. Any member violating any of the provisions of this article may be fined a sum equal to twenty-five (25) cents per foot for all stone bought or sold contrary to the provisions of this article; said fine must be paid within thirty days or such member shall stand suspended, as provided in Article V.

AMENDMENT.

SEC. 5. Any member violating any of the provisions of this article may be fined a sum equal to fifty (\$50.00) dollars per car, or any part thereof, for all stone bought or sold contrary to the provisions of this article; said fine must be paid within thirty days or such member shall stand suspended, as provided in Article V.

(Signed)

REESE LINDSAY & CO.,
J. P. & E. A. KNOX,
BUENTE & MARTIN.

Motion that it be laid on the table lost.

Mr. Lindsay explained that it was intended to reduce expenses of the executive committee. Adopted.

On motion Messrs. Martin, Knox and Clark were appointed a committee to draft resolutions of regret upon the withdrawal of Mr. G. A. McArthur, and reported as follows:

Your committee appointed to draft resolutions expressive of the association's regret at the withdrawal of Geo. A. McArthur from the stone business, submit the following:

WHEREAS, The members of this association have learned with regret of the retirement from the stone business of Mr. Geo. A. McArthur, late assistant secretary of the Cleveland Stone Co., and an earnest co-worker among us, and

WHEREAS, He has, by his genial manners, strict business integrity and other estimable qualities, endeared himself to us both in a business and social way;

Resolved, That we, the members of the Cut-Stone Contractors' and Quarrymen's Association, in convention assembled, express our deep regret at the withdrawal of Mr. McArthur from our midst, and tender him our best wishes for success in whatever field he may select; and be it further

Resolved, That a copy of these resolutions be spread on the minutes of the association, a copy, suitably engrossed, be mailed to Mr. McArthur, and that the same be published in STONE, the official organ of this association.

Adopted unanimously. Adjourned until 2 p. m.

AFTERNOON SESSION.



KNOX

E. A. Knox. A majority of the votes were for the latter, and on motion of Mr. Alston his election was made unanimous.

The names of Messrs. Haldeman, Malone and Rolf were placed in nomination for vice-president. Mr. C. O. Malone withdrew his name owing to long service in same capacity. Mr. Rolf was elected, and on motion of Mr. Haldeman the same was made unanimous.

For the office of secretary but one name was placed in nomination, that of C. F. Buente, who was elected unanimously.

Messrs. John Schreiner and John Clark were nominated for treasurer, resulting in the choice of the latter.

Nominations for members of executive committee were as follows: David Morrison and C. Jordan, contractors; C. W. McCormick, C. O. Malone, L. P. Haldeman, Joseph Hartman (withdrew), W. C. Stewart and Reese Lindsay, quarrymen. Resulting in L. P. Haldeman, W. C. Stewart and Reese Lindsay being elected.

The installation of officers was then proceeded with. Mr. Knox, in a few well chosen words, eulogized the splendid work of his predecessor, Mr. Reese Lindsay, and called upon the executive committee to aid him in



ROLF.

making his administration equally effective; believed in upholding the principles of the organization and thoroughly investigating all honest claims. He introduced Mr. Rolf, the newly elected vice-president, who responded with assurances of hearty sympathy in the work of the organization and a desire to contribute to its success. The other officers were introduced and duly installed.

Mr. Reese Lindsay took the floor and after making some very flattering remarks concerning STONE, made a motion that it be constituted the official organ of the association. The motion was promptly seconded, and carried unanimously.



CLARK.



D. H. RANCH, N.Y.C.

Mr. Martin, of the committee on arrangements, invited those present and their friends to a banquet to be given that evening, and after deciding to leave the question of date and place of next meeting open, the convention adjourned.

THE BANQUET.

AS early as 7 o'clock the guests began to arrive. Among them were a goodly number of architects. An hour was spent in an upper hall of the Duquesne in an informal exchange of fraternal regards and at 8:30, to the inspiring strains of Toerge's orchestra, the march was taken to the banquet hall. Covers were laid for 150 guests and there were but few vacant chairs. It has been ordained by the "head pushers" of this famous association that everything in the way of entertainment shall be on a scale of regal splendor, and this occasion was no exception. The gorgeous decorations of Witherow's banqueting hall, the gaiety and hilarity of the festive banqueters, the electric rays of a thousand lights dazzlingly reflected from the shining silver, the savory and delicious viands, the sparkling and exhilarating vintage, even the post-prandial oratory itself, all told the same story of joy, happiness, progress and prosperity, perfect satisfaction with the past and luminous hopes for the future.

Our artist has but feebly depicted the scene with his camera. The *ménus*, which were hand-painted and typical of the anniversary of St. Valentine's natal day, read as follows:

HUITRES.		
Blue Points, en Coquilles.		
POTAGES.		
Consomme, Princesse et Purée St. Germain.		Amontillado.
HORS D'OEUVRE.		
Olives.	Celery.	Amandes, selle.
POISSON.		
Filet de sole, au Vin Blanc.		Sauterne.
Pomme Hollendaise, Concombre.		
RELEVÉ.		
Filet Pique, aux Champignon		St Julien.
Haricots Verts et Pommes, Risolette.		
ENTRÉE.		
Terrapin, à la Duquesne.		
Sorbet, au Kirsch.		
ROTI.		
Squab, au Cresson.		Pommerey Sec.
Lettuce Salad.		
DESSERT.		
Forme de Glace et Gateaux		
Fruit.		
Fromage de Brie et Roquefort.		
Demi Tasse.		Cognac.

After a quartette, "A Sailor's Life," by Messrs. E. Dermitt, D. E. Nuttall, John A. Strous and O. D. Forney, President Knox in a few words greeted those present and announced as the first toast, "Our Association 99 per cent. Silica," which was responded to by Ex-President Lindsay.

Mr. Lindsay was at times very happy in his remarks and was frequently interrupted with applause. Following closely his subject he gave a chemical analysis of building stone, and continuing said: "Our association has been defined as consisting of 99 per cent. silica. The remaining 1 per cent. is what? Water? Well, judging from our present surroundings, I do not think any of you will accuse us of having water in our composition. Is it waste? Will anyone admit that we have wasted anything in this part of our make-up? However, as they have made the assertion that we are 99 per cent. silica, we can safely leave the remaining 1 per cent. for our friends to place."

Mr. Lindsay then spoke of the benefits of the association, referred to the importance and magnitude of the building trades and broke a lance in defense of the much-abused contractor, saying: "The other day I saw a statement in a trade paper that the building industry in this country in its many branches amounts to a greater sum annually than the iron, steel, glass, leather, cotton, woolen and other industries of the country combined; and yet, in some instances it is regarded as almost a crime to be a contractor. In our local political contest one of the candidates, in a recent speech, claimed as a special fitness for the office he aspired to that he made the contractors on a public building live up to their agreement. What a reflection on the poor contractor! A man who had the brains and ability to carry on and successfully finish at the time agreed, a contract involving nearly three millions of dollars, to have his character assailed by a man, who, perhaps, has neither the ability nor sand to do \$3,000 worth of work. Mr. Toastmaster, I do not want to introduce politics into this gathering, but I cite this as an expression of the general feeling toward contractors in many places. I am perfectly well aware that there are many contractors who were never intended by their Creator, the laws of the country, or any canon of society to be in business for themselves; yet, on the other hand you will find among the army of contractors as many high-minded and honorable men as you can find in other branches of trade. I do not know of any business where the risks are so great, the details so exacting, and the profits so small as that of the contractor, whether he supply the material or erect the structure; and I venture to say that there has never been a building erected in which the contractor did not give more material and labor than the strictest interpretation of the specifications and plans could imply."

After more music Mr. H. Mæser was introduced as the oldest architect in Pittsburgh, and one of the first to practice his profession here. He responded to the toast, "The Old and the New." His address was largely

reminiscent and historical, and illustrated the gradual change from primitive conditions in the architectural and building lines in Pittsburgh to modern ideas. He concluded by likening this country to a magnificent temple of classic architecture, designed and planned by the fathers of the revolution, whose specifications were the constitution, and who laboriously laid the foundations in mortar made of the cement of adversity and trial mixed with the blood of patriotism, having an abiding faith that their posterity would complete the superstructure, until it should stand forth the bright and magnificent creation that it now is. "Our duty," he said, "is to ornament, embellish and ennoble the great structure for our posterity, in accordance with the design of the great architects who planned it, that it may serve as an ideal and inspiration for all mankind."

Mr. Samuel Francis, president of the Builders' Exchange, responded to the toast, "Plumb, Straight and True," and in the course of his remarks paid a pretty tribute to the builders. A Chauncey Depew for the evening was found in the person of the inimitable Col. Chill W. Hazard, whose humorous utterances were simply irresistible. He was down for a toast, "All Beds Must Be Level and Solid," and wandered all the way from Dante's "Inferno" to Milton's "Paradise" in his discussion of the subject. Impromptu addresses were made by Messrs. T. D. Alcorn, a member of the bar; Thomas J. Hamilton, and Ira P. Rowley, representative of Stone, and after a vote of thanks to those who had contributed to the entertainment of the evening, and "Good Night" from the quartette the feast came to an end. It was unanimously voted a most enjoyable affair.

Wednesday morning was devoted to sight-seeing, the visitors being taken by a local committee to Carnegie Bros.' big steel works at Bessemer. Returning, the quarry owners tendered the cut-stone contractors an informal supper at Newell's Café where "a feast of reason and a flow of soul" prevailed until theatre time, when the quarrymen in turn became the guests of the local contractors, who took them in a body to the Alvin Theatre. Inducements were held out for the next day but a wholesome regard for their æsophagi, led those from a distance to pack their grips and depart with pleasing recollections of the hospitality of the Allegheny County Association.



THE NATIONAL ASSOCIATION OF QUARRY OWNERS.

THE second annual meeting of the National Association of Quarry Owners was held Tuesday, Feb. 21 in Parlor A of the Grand Pacific Hotel, Chicago. The meeting was called to order at 10 a. m. President Marshall occupied the chair and in the absence of Secy. McGee, Ira P. Rowley, representing STONE was chosen secretary pro tem. Owing to the multiplicity of other conventions in which quarrymen took part there was a light attendance. The following firms were represented: Acme Bedford Stone Co.; Ashland Brownstone Co.; F. R. Caden Stone Co.; The Buena Vista Freestone Co., (proxy); Cedar Valley Stone Co.; The Malone Stone Co.; Matthews Bros.; Oolite Quarry Co.; Portage Redstone Co.; Perry, Matthews & Buskirk; Stinesville & Bloomington Stone Co.; W. R. Smith & Sons; Terre Haute Stone Works Co.; The Vernon Brownstone Co.; F. G. Clarke Bluestone Co.; Dearborn & Sons, Detroit Union Stone Co.; Detroit Brownstone Co., and East Tenn., Stone and Marble Co.

Mr. Marshall delivered his address embodying the points mentioned in the paper read by him before the quarrymen in attendance at convention of the Ohio Valley Cut-Stone Contractors' and Quarrymen's Association which was well received. The reports of the president were read and approved. The committee on measurements, appointed at a previous meeting reported as follows:

CHICAGO, February, 21, 1893.

To the president and members of the National Association of Quarry Owners:

GENTLEMEN—We, the undersigned, committee on measurements appointed at your last annual session beg to submit the following as the result of our brief deliberation given the subject: First, we find that in order to harmoniously reconcile the various ideas of how stone should be measured and sold, it will be necessary to classify the stone into as many classes as there are distinct purposes for which it is used, that cannot be subjected to the same measurement with too much inconvenience or irregularity in determining quantities. In order to meet these requirements, as far as we have given the matter consideration, we would suggest the following order of classification, and systems of measurement therefor: Mill blocks, including all block stone for sawing purposes, and cut-stone work—measurements shall be expressed in cubic feet, and measured to what it will straighten between beds, measuring to square from the thinnest edge and narrowed beds, allowing one-half inch off from each surface for saw kerf. Unless special dimensions are required, either one, two or three ways, and of any shape other than square, in which case the stone must be quarried as ordered with one-half inch surplus on each face.

BRIDGE STONE; ALSO FOUNDATION, ETC.:

The cubic contents of which shall be expressed in cubic yards, and measured as follows: Face work, excepting coping, etc.—Measure from the longest and best edge for the face of block, and then proceed to take the other dimensions, and measure so as to get the actual cubic contents of the space it will occupy back of the wall line of the masonry, after being bedded and jointed, allowing enough to extend vertical joints into masonry twelve inches at right angles with the face line. Backing—Measure to secure full cubic contents of what it would displace in water after being bedded, nothing for face or vertical joints being allowed. Coping, Footing, etc.—The stone must be quarried to dimension three ways, if required, but where a special dimension is not required the full three ways for each block, the quarryman shall supply the stone

quarried to as many dimensions as required, and of any other practical size not specified as may serve his convenience, and together with a number of other blocks, fill a given space, in compliance with the specifications, and measure so as to determine the actual cubic contents after making sufficient allowance for joining and bedding. If preferred, engineer's measurement, being wall measurement, may be taken in cubic yards for all bridges and foundation masonry. Scrap stone, such as may be used for railroad ballast, flux, concrete, rip-rap, macadamizing, etc., shall be sold either by ton of 2,000 lbs., or cubic yard. Sawed stone—Sawed either one, two or three ways, shall be measured to determine the actual cubic contents of the sizes required, and expressed in cubic feet. We further recommend that upon the adoption of a definite system this association take such action as will effect an early understanding and mutual agreement between this and all other associations interested in stone. Respectfully, W. R. Smith, Jr., Chairman; C. O. Malone, J. S. Williams, T. V. Thornton, (Absent), J. G. Bodenschatz, Committee.

Adopted. Adjourned until 2 p. m.

AFTERNOON SESSION.



E. T. MALONE.

Calling the meeting to order President Marshall referred to the large number of communications he had received from quarry owners expressive of earnest sympathy and support. The secretary acting under instructions read the following:

PORT CHESTER, N. Y., February 21, 1893.

Sylvester Marshall, President National Association,
Grand Pacific hotel, Chicago.

Impossible to be present. You have our best wishes. Let us know results.

CARPENTER BROS.

GREENSBURG, IND., Feb. 18, 1893.

To Sylvester Marshall, President National Association Quarry Owners.

DEAR SIR:—Your favor of 10th inst only reached us to day. It is a plain case. You are on the right road *certainly*. The selling at *quarry* and by *weight* should be done. We, however, have sold by weight for the past six years, but the *delivering* at out points is all wrong and we *cannot* sell without, as *others will*, which compels us to do so. Our engagements, we regret, will make it impossible to send a representative.

Yours respectfully,

GREENSBURG LIMESTONE COMPANY,
Per H. H. Woolley, President.

PHILADELPHIA, PA., February 20, 1893.

Sylvester Marshall, President.

DEAR SIR:—Your favor of 10th at hand; came too late for us to send a representative to your meeting in Chicago. Nevertheless you have our hearty coöperation in anything for the benefit of quarry owners in general. Please send us a copy of proceedings of your meeting.

Truly yours,

EZEKIEL STEWART, President.

CHICAGO, Feb. 17, 1893.

Sylvester Marshall Esq.

DEAR SIR:—Your favor of the 10th received this a. m. You are on the right track. Shall try and be with you on the 21st.

Yours truly,
W. H. SINGER, of the Superior Brownstone Co., Ashland, Wis.

ST. LOUIS, MO., February 20, 1893.

Sylvester Marshall Esq., Chicago, Ill.:

DEAR SIR:—Yours of the 10 inst. at hand. I am sorry to say that, owing to the late arrival of your kind invitation and the necessity of my presence here for the next few days, I cannot attend the next meeting of quarrymen. However I will say that I am heartily in favor of a some such move, as suggested, to further the interest of the quarryman; there is no doubt more room for improvement, than otherwise, in this particular business as I know of hardly anything to make the quarryman's condition any worse

than what it is at present. I consider it has gone to the dogs about as far it can get. Please to advise me of what the meeting may accomplish and count upon the co-operation of me in anything that is reasonable to help to improve the general condition of the stone business.

Yours very respectfully,

GUSS M. VIERNOW.

DULUTH, MINN., February 20, 1893.

Sylvester Marshall, Pres't Nat. Ass'n of Quarry Owners, Chicago, Ill.:

DEAR SIR—We regret exceedingly that it will be impossible for us to be present at the first annual meeting. We are in sympathy with your views regarding the necessity for action in the matter of prices, measurement, etc., and trust that such measures may be adopted as will be of benefit to the entire quarrying industry.

Yours very truly,

IRON RIVER BROWNSTONE CO.
J. F. Cargill, Sec.

PHENIX, MO., February 18, 1893.

Sylvester Marshall, Esq., Chicago, Ill.:

DEAR SIR—Your letter of the 16th just received and noted. I am anxious to do anything to advance the stone interests. If I should fail to be present would be pleased to know the conclusions of the meeting.

Very respectfully yours.

PHENIX STONE AND LIME CO.

ST. LOUIS, MO., February 20, 1893.

Sylvester Marshall, Esq., Pres't Nat. Ass'n of Quarry Owners,

96 Washington St., Chicago, Ill.:

DEAR SIR—We acknowledge receipt of your circular letter to the Hinckley Stone Co., of South Greenfield, Mo., now changed to above company. While it is impossible to attend your meeting at Grand Pacific Hotel in your city on 21st inst., we would be pleased to receive any information of its action in regard to matters spoken of in your letter and what success developed as to the forming of such an association and its probable cost of membership, fees etc., and its prospective benefits.

Yours resp'y,

MISSOURI MARBLE CO.

EAST SIOUX FALLS, S. D., February 21, 1893.

Mr. Sylvester Marshall, Chicago, Ill.:

DEAR SIR—Your circular letter of the 10th inst. announcing a meeting of the National Association of Quarry Owners, was received by us on the 18th. We appreciate fully the advantages that should follow an organization of this character, provided all quarry owners would join; and regret exceedingly that we are unable to be represented. We are with the movement in sentiment and principle, and had we had a little longer notice would have been represented.

Yours very truly,

G. H. PERRY, Manager.

CONCORD JUNCTION, MASS., Feb. 19, 1893.

Mr. Sylvester Marshall, 96 Washington St., Chicago, Ill.:

DEAR SIR—Your pleasant invitation was rec'd 19 inst. Must say it is impossible for me to be with you this time but I wish the National Association of Quarry Owners a successful meeting. I am in full sympathy with all you hope to do in every sense and regret very much that I can't start off Monday morning but time is too short for the preparation that I need in way of leaving my cares. Hope I may know how the meeting gets on and the result as I must be content with that this time; hope to meet with this body of men in the future. My stone business is small yet, but my interest in the welfare of my brother quarrymen is large.

Very respectfully yours,

JEREMIAH SHEEHAN.

KILLBUCK, O., Feb. 17, 1893.

Mr. Sylvester Marshall, Chicago, Ill.:

DEAR SIR—Your favor of the 10th received. I think it will be impossible for anyone of our firm to attend the meeting on the 21st, as they are all south and will not return before March 1st, 1893. Anything the association may do shall meet with our approval.

Truly yours,

KILLBUCK BROWNSTONE COMPANY,
Per Chas. E. Duer, Sec.

DELL RAPIDS, S D., Feb. 19, 1893.

Sylvester Marshall, Esq.:

DEAR SIR—I regret to say it will be impossible for me to be with you at this time owing to a previous engagement, but am in sympathy with you and hope to meet with you next time. Please notify me of your meetings earlier, so we can have more time to get around.

Very respectfully yours,

DELL RAPIDS GRANITE CO.,
Per R. Simpson.

ELYRIA, O., Feb. 20, 1893.

Sylvester Marshall, 96 Washington-st, Chicago, Ill.:

DEAR SIR—Your favor of the 10th inst. at hand and noted. It would be impossible for a representative of our company to be present at your meeting to be held in Chicago on the 21st inst. We would be pleased to do what we could to further bringing about the reforms and changes in the stone trade enumerated in your letter. We believe that all the points mentioned are ones that should have attention in the lines suggested. We certainly would be willing to join in any movement that would be for the benefit of the stone interest. As present conducted the business is greatly demoralized and the room for improvement is greater than in any business of which we have knowledge. Our sympathies will be with you and as far as possible will coöperate in bringing about the reforms mentioned.

Yours respectfully,

W. L. FAY, Sec.

HOUGHTON, BAYFIELD CO., WIS., Feb. 20, 1893.

Sylvester Marshall, Pres't Nat. Ass'n Quarry Owners:

DEAR SIR—Your letter of the 10th was received by us too late to be able to get to Chicago in time for the meeting. You have our best wishes for a successful meeting. No one knows better than we how much we need some reform in the stone selling and shipping in general.

Yours truly,

HARTLEY BROS.

RICHMOND, VA., Feb. 18, 1893.

Sylvester Marshall, Pres't Ass'n Quarry Owners, Chicago, Ill.:

DEAR SIR—Your favor, dated Feb. 10th, just received with post mark 16th. We regret that the time is insufficient for us to make any arrangement to take part in your meeting of the 21st inst. We wish to state that we are in full sympathy with the objects of your association and it would have given us much pleasure to listen to the interesting discussions which must undoubtedly be forthcoming, and hoping we shall be favored with a full report of your doings. Wishing you every success, we remain

Yours truly,

GEO. W. CLARK, Sec.

CLEVELAND, O., Feb. 21, 1893.

Sylvester Marshall, Pres't Nat. Ass'n Quarry Owners:

DEAR SIR—Yours of the 10th inst. at hand and answer delayed on account of members of the firm being out of town. We have carefully looked over matter and we heartily indorse all the points spoken of, and we sincerely hope that the plan will be brought about. Assuring you that only pressing engagements keep us from coming, and, wishing the National Association of Quarry Owners of the United States the best of success, we hope to remain

Yours truly,

MAXWELL, ROLF & CO.

BAY CITY, MICH., Feb. 20, 1893.

Sylvester Marshall, Chicago, Ill.:

DEAR SIR—Your favor of Feb. 10th received by the secretary of our company and was not shown me until to-day. I should have been glad to have met with the association of quarry owners at this meeting. I fully indorse all that you say in your letter of the 10th, and believe it very important that an effort be made in this direction, with a view to getting a fair margin and such prices as we are entitled to as quarry owners. Perhaps at some later date I may be able to meet with you.

Yours truly,

W. I. BROTHERTON, President,
W. I. Brotherton & Co.

ASHLAND, WIS., Feb. 20, 1893.

Sylvester Marshall, Nat. Ass'n Quarry Owners of the United States,

96 Washington-st., Chicago:

DEAR SIR—Your favor of the 10th inst., addressed to Houghton, has just reached this office and we hasten to say that it will be impossible to have a representative at your

meeting on the 21st, which fact we regret very much, as the object stated in your letter, we fully appreciate, will be a grand thing for the quarries if carried out. We regret very much that our Mr. Prentice can not be present with you, as there are questions coming before this meeting which we consider very important to the quarrymen of this country and you can count upon our being with you upon any of these questions. Hoping you success, we are

Yours very truly,

THE PRENTICE BROWNSTONE CO.,

By F. E. Goddard, Sec.

BUENA VISTA, O., Feb. 18, 1893.

Mr. Sylvester Marshall, Chicago, Ill.

SIR—Received your letter to-day and noted contents. We are sorry that we have received your letter too late to permit any of us to come to the meeting next Tuesday. We indorse your proposition regarding delivering and also to change from measurement to weighing. We have never delivered stone to places outside of Cincinnati and to that place we transport in our own boats. If anybody buys stone from us he must pay through freight and carry the risk himself. We have experienced very little trouble in measurement, yet we prefer the weighing of the stone. We have never employed agents and will not do so hereafter. Stone agents run the business and you are the slaves of them and let them reap the profits. The writer is in the business since 1856 and has some experience. We have not attempted to gain business by cutting prices and consequently we have made some profit while our competitors in the quarry business have fared worse; yet we fear that the regulation of prices will be very difficult, but we hope that our fellow members of the National Association will keep the agreement, if any is made. With our hearty wishes that some good will be done at the meeting we remain

Yours respectfully,

BUENA VISTA FREESTONE CO.,

W. L. Caden, Sec.

MANASSAS, VA., Feb. 18, 1893.

Sylvester Marshall, Esq., Chicago, Ill.

DEAR SIR:—Yours of 10th inst. just to hand. Owing to the shortness of the time between now and the 21st it will be impossible for me to attend your meeting. I heartily indorse your views as to prices, measurement, etc. I sell the major part of my stone per ton, and invariably quote price f. o. b. cars on quarry sidetracks. Wishing you abundant success in your undertaking, I remain

Very respectfully,

JOHN R. TILLET.

DULUTH, MINN., Feb. 18, 1893.

Sylvester Marshall, Esq., Pres. Nat. Ass'n. of Quarry Owners, Chicago, Ill.

DEAR SIR:—Yours 10th inst. reached us yesterday p. m. Regret to advise that it is impossible for us to be with you on the 21st instant, but will say that we are in sympathy with the objects you are trying to attain. Thanking you for your invitation,

Yours truly,

JOHN H. CROWLEY,

For Duluth Brownstone Co.

NEW YORK, Feb. 18, 1893.

Sylvester Marshall, Pres't. Nat. Ass'n. of Quarry Owners, Chicago, Ill.

DEAR SIR:—We have your favor of the 10th inst. and we shall be pleased to contribute in all possible ways to the success of the association. We will try to arrange to have one of our directors present at your first meeting. Nearly all of our product is sold f. o. b. and we find this plan very satisfactory.

Yours very truly,

PALISADE TRAP ROCK CO.,

Per W. D. M.

ALBION, N. Y., Feb. 20, 1893.

Sylvester Marshall, Esq., Chicago, Ill.

DEAR SIR:—Your favor of the 10th inst. only reached us yesterday. Had a timely notice of the meeting been sent we should have been pleased to be represented. In a few words we can state our opinion of the matters under discussion. As to measure or weight, we are for selling stone by weight, when possible or practicable. We pay no freight ourselves ever but all our product is f. o. b. Neither do we sell to middlemen. Our contracts are made direct with the contractors or builders, for either buildings or street work. We think this method general around this district too, so that what would affect us mostly is getting a national system of weight or measure. Your association has our hearty sympathy and we would like to be with you in person. May we ask for a copy of the minutes of your meetings?

Very respectfully yours,

GOODRICH & CLARKE STONE CO.

DETROIT, MICH., Feb. 18, 1893.

Sylvester Marshall, Esq., Pres't Nat. Ass'n. of Quarry Owners, Chicago, Ill.

DEAR SIR:—In reply to yours of the 10th inst. Would say we heartily indorse your views of the stone business and would be pleased to be with you on the 21st but other business engagements render it impossible this time, however, we will render every assistance in bringing about the reforms noted, and hope to be with you when you meet again. Wishing you every success in this movement,

We are yours truly,

DETROIT & HOCKING VALLEY REDSTONE CO.
Per R. W. Webb, Sec'y.

ELLETTSVILLE, IND, Feb. 18, 1893.

Sylvester Marshall, Esq., Pres't Nat. Ass'n. of Quarry Owners, Chicago, Ill.

DEAR SIR:—In reply to your kind invitation to attend the annual meeting on the 21st, will say that it is uncertain whether we can be with you at that time, but can assure you that we heartily approve all measures that look to the upbuilding and advancement of the stone interests in this country. Thanking you for your kindness, we are

Very truly yours,

PERRY BROS.

CROMWELL, CONN., Feb. 18, 1893.

Sylvester Marshall, Esq., Pres't., 96 Washington st., Chicago, Ill.

DEAR SIR:—Yours dated Feb. 10, but post-marked Feb. 16, received this a. m., notifying us of the meeting of National Association of Quarry Owners, on Feb. 21. This comes too late for me to make arrangements to attend same, for which I am very sorry, as I am sure that these steps you propose discussing at this meeting are in the right direction. The one as to cutting prices, more especially, which hurts every one in the stone business and more especially the quarryman who does the cutting. We have only one market where we sell stone delivered by rail in any way except f. o. b. cars at quarry. When shipped direct from quarry to consignee by water we make our price delivered, freight payable by consignee and deducted from the bill, which arrangement I don't think we should care to change as I think we can do it to better advantage to ourselves and customers than they could. As to selling stone by weight, a great part of our product is sold in that way when shipped by rail would hardly be practical when shipped by water. Hoping to hear from you again I remain

Yours respectfully,

NEW ENGLAND BROWNSTONE CO.
W. F. Ramsey, Sup't.

TOLEDO, O., February 17, 1893.

Sylvester Marshall Esq., Chicago, Ills.

DEAR SIR:—Yours of the 10th is at hand. We feel the evils you refer to and believe that the system of selling stone by weight is the fair one for producer and consumer. Once that becomes the custom the question of price will be more easily determined and maintained. Unity of action among producers cannot but bring good results and we have every hope that your organization will be successful. We cannot say now that we will be there. Our trade in stone does not extend over much territory and we perhaps do not feel the evils you speak of so much as those whose trade is more widely spread. We experience such trouble as you refer to and will do our part to help the cause along.

Respectfully yours,

C. H. SAWYER,
For the Lime City Co.

CANTON, O., February 20, 1893.

Sylvester Marshall, Esq., Pres't Nat. Ass'n of Quarry Owners, Chicago, Ills.

DEAR SIR:—Your circular letter is just received and noted. We heartily indorse all that you say therein and while it is impossible for us to be with you (a previous engagement of great importance to us preventing same) we sincerely hope that your meeting may be productive of much good to the trade. I will add as a matter of interest, that we have been working for the past year to get the quarries in our immediate vicinity to get together and agree on a list of prices in which there would be a margin for the producer.

KITZMILLER STONE Co., Canton, O.

MANSFIELD, O., Feb. 18, 1893.

Sylvester Marshall, Chicago, Ill.

DEAR SIR:—Your circular letter of the 10th inst. has just reached us. I am sorry to say that on account of having made previous arrangements for the occupation of my entire time next week, I will not be able to meet with you in Chicago on the 21st. We are interested in the objects of the meeting, as set forth in your letter, and in your asso-

ciation generally. We will be glad to know something more of your plans in general and to hear the results of your meeting in particular. Thanking you kindly for your invitation, we remain

Yours truly, C. W. FRENCH,
Pres't the Richland Stone Co.

RIVERSIDE P. O., FOUNTAIN CO., IND., Feb. 20, 1893.

Mr. Sylvester Marshall, Chicago, Ill.

SIR:—We have just received your letter at this date and of course it is too late to attend your convention, but we will say that we have not sold stone of any kind only by weight and will not sell any other way, F. O. B. on cars at quarry. We find it greatly to our advantage to sell only that way. We hope that you will be successful in your efforts to put stone on its proper footing in all of the markets of the country.

Yours truly, GUYER, BURCHBY & CO.

On motion of C. O. Malone these communications were ordered placed on file and published in the official organ as evidence of the popular sentiment among quarry owners relative to a national organization. Upon request Mr. Rowley, representing STONE, read the following paper.

ORGANIZATION.

I believe I will not be disputed when I assert that there is not a body of men nor a single industry in the United States, that has the respect of the public in greater degree than the fraternity of stone producers. There is not another body of men in this country who could exert a greater influence upon legislation, upon the welfare of their districts or in behalf of their own interests than the quarry owners. But when I say this, the assertion must refer to the possibilities and not to the fact. There really is not another body of men in America of equal numbers and standing who exert so little of their influence upon legislation, upon the public, or in behalf of their own interests, as the stone producers of America and this is not because of want of good will, or want of earnest purpose, or want of power but is due and solely due to want of organization.

The day of small things is past in America. The influence of a single individual, no matter what his wealth, is little in comparison with the gigantic operations of modern law or society, or commerce. That quarrymen have seen all this, and felt this is true enough, and I would insult their intelligence were I to insinuate that they had not. That they have made numberless attempts to form associations and that these quarry owners are here to-day is proof that they, as well as others recognize the necessity of organization. These attempts have not failed. They simply have not succeeded in all the aspirations of the most progressive quarrymen because the great body of them have not been permeated with a necessity for action and concert; and they have not thus been effected, because until quite recently this great body has not felt the spur of that stern necessity which, after all, is the goad that urges us onward. But why is this? It is because while a good share of the stone business resides in or near the great centers of trade and along the railway arteries of commerce, the majority of them reside far from the highways, in the byways of the country, where the sound of the channeller and drill, the creaking of the hoists, is mingled with the robin's call and the sweet voiced notes of the thrush; where nature's mantle of peace and quiet is spread over his surroundings so soon as the whistle blows and he is safe from the sea of turmoil and strife that beats fiercely around his unfavored brother of the city. Such a man cannot see the necessity for organization, because he cannot feel it, and if such are not with us to-day, we must not blame them for lassitude and indifference, but put ourselves in his place and see how unwilling we should be to disturb such a pleasant tranquillity, or to leave it, were once we to be placed in it.

But the logic of life and the irresistible economies are pursuing this class of stone producers in their hiding places. Railroads penetrate, like a net-work of nerves, the entire length and breadth of the land. Few are now the sections they do not control, and whenever they come they at once place every hamlet in the whirlpool of the world's commerce. Last summer I visited the freestone district of Southern Ohio and found quarries whose resources once developed only to such an extent as to supply local demands were by the introduction of transportation facilities, being worked most aggressively. A few years since the quarry owners of that section could have had no argument presented them that would have pointed out the benefits accruing from organiza-

tion. To-day they have an association which has but recently celebrated its first anniversary. At which meeting its members extended mutual congratulations upon the splendid work of the year. Such associations, in my opinion, are the arteries which



SMITH.

must feed the national organization by sending representatives to its annual meetings. This association has been the first, I believe, to test the value of this theory having appointed as a delegate to this convention Mr. W. R. Smith Jr., who has just entered upon his second term as secretary of this model organization. I say model organization advisedly from a careful review of their records for the initial year of their existence, and having the interests of the stone producers at heart, as much as mortal man can, whether from mercenary motives or not matters little here, I say I should like to see similar associations formed elsewhere. By making this national association a delegate body, the many evils encompassing quarry owners in various districts could be removed by concerted action of the entire assembly, just as has been done with associations having other trades as a constituency, whose local needs are cared for by the foster association.

The quarry owner as a separate individual is met everywhere by a series of powerful units. In the matter of freights, he is at the mercy of three or four powerful syndicates of railroad magnates and the value of his property arbitrarily established by men who have no further sympathy in them than to extract the last penny of profit. When he seeks entrance into the markets of the world he is forced to pay tribute to Tom, Dick and Harry or else his stone which he is willing should stand strictly on its own merits is unpopular and sales cannot be made. Such a thing as a "free market" is unknown to him. All that business sagacity and prudence would dictate as a wholesome business policy avails him naught. The architect's whims and caprices affect the producer and contractor as well. The selling agent takes a hand at shaving the quarry owners' profits, and the cut-stone contractor too often essays the role of autocrat and dictates terms so arbitrarily as to completely paralyze the balance sheet of the man who has hazarded a fortune upon the too fickle chances afforded by investments in stone lands. Add to this the cost of development, with its attendant care and worry and then tell me where you will find another industry in such need of protection as the quarry interests of this great country; where so little is realized on an investment of capital; where so little recompense is vouchsafed for arduous toil and endless worry. And has it ever occurred to you that in one respect you are more unfortunately situated than any other producer, in view of the fact that when you have once sold a block of stone you have disposed of that which nature has been for hundreds of years



MATTHEW 3.

manufacturing? That there is nothing to take its place. He who produces from raw material a salable article has this advantage over you. No matter what the demand may be he will ever be ready to supply it. You have seen quarries abandoned after forty or fifty thousand dollars had been expended in opening them, and placing yourself in the position of the man who had passed through the experience, have said, "Well, if there wasn't more there than he got out of it I would never have opened it." You are like the man who was called upon to write an obituary of a very young baby, and found expression of his sentiments in a very few lines:

"So soon was he done for

I wonder what he was begun for?"

No, gentlemen, you have too much at stake to proceed further in the aimless manner you have. You are too good business men to be dictated to by those who should be subservient to you. You should have better prices for your product, you should have the same influence with railroad corporations that trades of lesser importance than yours enjoy. You should regulate measurements and be able to compute the profit on your stone as soon as it is loaded on the cars at your quarry. The hundred and one small evils encompassing you should be removed and this can only be accomplished by organized effort.

F—Stone.



ROWLEY

Organization is the logical corrective of unsatisfactory trade conditions. It means simply mutual understanding and regard for the individual rights of each other. When men can be prevailed upon to act toward each other in the same spirit that every man desires all others to act toward himself, the problem is solved.



MALONE.

I believe the general conditions necessitating organization are understood. The means of reaching a result are not so clearly defined. Nor is it within the province of this paper to outline them. The general suggestions I have in mind refer simply to harmony and encouragement to district organizations.

The nucleus of success lies in the first proposition. Harmony grows out of acquaintance and appreciation of the fact that one may benefit himself by benefiting his neighbor and this naturally leads up to the second proposition of district organization. Attempts may be made to organize on another basis but it is not organization.

Individuals cannot as yet concentrate as one man so long as the abuses they are subjected to partake largely of a local character. They are like a lot of freight cars stranded on a side track. They are neither linked together nor is there a motive power to move them. As they stand they are the separate part of a powerful machine and they will be practically as inert until the parts are put together so that the steam (which represents the whole mass of membership) can be turned on to move the whole, guided by the brain and experience that the collected judgment may elect to be the engineer.

I would strongly urge that the sense of this meeting be expressed toward a federation with district associations the same to be organized by those in attendance at this meeting. This is the organization of the United States government and also of the most successful trades. In it power would perpetually reside in the district and be influenced by the individual quarry owner and at the same time the power of the whole could be welded together by the national body as occasion might dictate. The real failure to properly organize this national association has lain in the want of coherence among quarrymen.

A number of men may enroll themselves as a district organization but they would represent no higher authority than themselves. This would not be true of a delegate body which would represent not only the authority but the wishes and aspirations of the district. In cases where a difference of sectional interests threaten division they would naturally be left for each to decide according to their necessities. In fact it would be local self-government together with a powerful unity on those things that affected the whole trade.



DALTON.

The beginning must be made somewhere, it should start from here, because now is the best time and there are good men here as well as elsewhere. The times are ripe and the air is full of voices, and from them there is none that do not echo the words unity and concentration.

I can only briefly skim over the surface of this question here but it is one that I have met with in my environment for several years past—failures where organizations were impracticable—success where organization was perfected. If I have aroused your interest on these questions I will have done all I could have hoped. If I have inspired action to the convention I will be abundantly satisfied. If I have raised doubts, I hope to be able to answer them. But with you I am in sympathy and in any event I, with all who are here, will have done our part when each of us have done what we can.



RAWLE.

On motion of Jas. Williams same was ordered placed on file and published in the official organ, *STONE*. A discussion was had relative to the needs of the quarrymen and the importance of making the association more national in character. On motion Messrs. Smith, Matthews, E. J. C. Bea-

ler and J. B. Lyne were constituted a committee on ways and means for advancing the interests of the association. Adjourned to meet following morning.

FORENOON SESSION.



MARSHALL.

Mr. John H. Burke representing the East Tennessee Stone and Marble Co., was introduced and spoke as follows on behalf of the quarrymen of East Tennessee:

National Association of Quarry Owners of America, Grand Pacific, Chicago, Ill.:

GENTLEMEN—On behalf of the quarrymen of East Tennessee, I beg respectfully to solicit your attention to the recent action of the Government architects in the allotment of the marble work for the new Congressional Library. You have doubtless before heard of the discrimination exercised by these men against home marbles; of the total of \$639,300 apportioned for this marble work, but \$38,600 has been allotted to home product while \$600,700 is to be expended for the purchase of foreign quarries. The marble quarrymen of America assert and maintain that their quarries will produce marbles in texture superior to any that can be imported, while in diversity of color nothing is left to be desired; therefore they feel that there is absolutely no warrant for their practical exclusion from competing for the Congressional Library work. The quarrymen of East Tennessee taking the initiative, have formally protested against this outrageous discrimination and their action has been indorsed by quarry owners of the other marble producing states in the country. They now respectfully request that you also will take action condemning this unjust discrimination. They feel that this matter is of interest, not only to them but to all quarrymen of the country, and in fact to every patriotic American. They merely ask that where material is equal in quality, and price as low, preference shall be given to home products in the construction of our government buildings. Action such as that recently taken by the men in charge of the construction of the library building is an implied assertion that in their opinion the American material is inferior to that of foreign countries. This assertion totally false as it is, should be vigorously resented by every one interested in the development of the boundless and unexcelled, if not unequaled, resources of this country.

Very respectfully,

JNO. H. BURKE.

On motion of W. R. Smith, Jr., a committee was appointed to draft resolutions condemnatory of the action taken against American producers of marble.

Messrs. Smith, Caden and Clark were appointed as such committee and reported as follows:

WHEREAS, It has come to the knowledge of this convention that in the recent letting of contracts for the interior decoration and finishing of congressional library at Washington, \$600,700 worth of foreign stones were required to be furnished and only \$38,600 worth of the products of American quarries were permitted by Architect Green and Chief of Engineers, General Casey, to compete for acceptance for said building; and WHEREAS, The discrimination thus made in favor of foreign stone is unfair, unjust and un-American, in view of the fact that American quarries can furnish at equal prices stones of superior quality, durability and color; and, WHEREAS, American quarrymen are thus excluded from competition with the products of foreign quarries in furnishing material for a national American building, and are thus injured by an implied judgment that foreign stones are superior to the products of American quarries, and we view with indignation and regret the discrimination thus made against the producers of American marble, believing that they have been treated with unfairness and injustice, now, therefore be it

Resolved, That the members of the National Association of Quarry Owners in convention assembled, protest against such discrimination and extend to the marble producers of America our hearty sympathy and support, and be it further



CADEN.

Resolved, That a copy of these resolutions be sent to every marble producer in the United States, spread upon the records of this association and published in the official organ, *STONE*.

W. R. SMITH, JR.,
F. R. CADEN,
H. W. CLARK.

Adopted. The committee on ways and means reported as follows:

The committee in their report recommend, First, That article 4 be amended to require the election of three vice-presidents in order that a larger official representation may be obtained; Second, Recommended that article 2 of the constitution be amended by the addition of a fourth section, providing for the admission of local quarry owners' associations to membership; Third, That section 3 of article 2 of the by-laws be amended to empower the secretary with authority to further the interests of this association in securing additional membership, collecting dues, and that all initiation fees secured during his official term shall be allowed him as compensation for his services, and that a fund of \$1,000 shall be guaranteed to the secretary for his services; any deficiency guaranteed shall be paid *pro rata* by the members of the association at the next annual sessions and that the office of secretary be made a bureau of information.

W. R. SMITH, JR.,
W. N. MATTHEWS,
E. J. C. BEALER,
J. B. LYNE.

Adopted and acted upon by sections, the various sections being in turn accepted. Adjourned until afternoon.

AFTERNOON SESSION.

Called to order at 2:30. A discussion was had relative to the various assembling of trades in a body at the world's fair, resulting in the secretary being instructed to confer with the world's fair officials regarding best date for an informal gathering of all stone, marble and granite producers; same to partake of the character of a world's congress of quarrymen. A report to be made in printed form to all producers of stone, marble and granite.

On motion of Mr. Lyne, membership fee was reduced to \$25 until after said meeting.

The application for membership of the Detroit Union Stone Co., was received and accepted. An application for membership of the Joint Quarry Owners' Association of Southern Ohio was received and held in abeyance pending the decision regarding auxiliary associations. An election of officers was then had, resulting as follows:

E. T. Malone, president, Chicago; W. R. Smith, Jr., first vice-president, Otway, O.; W. N. Matthews, second vice-president, Bedford, Ind.; H. W. Clarke, third vice-president, Oxford, N. Y.; Ira P. Rowley, secretary, Indianapolis, Ind.; John Rawle, treasurer, 578 S. Morgan St., Chicago.

Executive Committee—Lycurgus Dalton, Oolitic stone district, Bedford, Ind.; Sylvester Marshall, Brownstone district, Chicago; C. O. Malone, Northern Ohio district, Cleveland, Ohio; Adolph Caden, Southern Ohio district, Buena Vista, Ohio.

On motion of W. R. Smith, Jr., a vote of thanks was tendered the retiring president for his arduous efforts in association work during the past year.

A motion that manufacturers and dealers in quarrying machinery and supplies be admitted as associate members upon payment of the annual dues, was carried, and after leaving the place of next meeting to be decided by the officers after the summer gathering, the meeting adjourned.

THE MISSOURI VALLEY ASSOCIATION.

THE sixth annual convention of the Missouri Valley Cut-stone Contractors' and Quarrymen's Association took place March 7, in the parlors of the Murray Hotel, Omaha, Neb. The roll call was responded to by the following:

R. M. Abercrombie & Co., St. Joseph, Mo.; Lawrence Bruce, Warrensburg, Mo.; Geo. Bussey, Topeka, Kas.; Cuthbert & Sargent, Topeka, Kas.; Drexel & Foll, Omaha, Neb.; Lauer Bros, St. Paul, Minn.; Benj. Melquist, Omaha, Neb.; Omaha Valley Cut Stone Co.; Omaha, Neb.; Pfeiffer Stone Co., St. Joseph, Mo.; A. Schall, Omaha, Neb.; A. Sutermeister, Kansas City, Mo.; W. H. Ulmer, St. Paul, Minn.; Jas. A. Young & Son, St. Paul, Minn.

President Pfeiffer called the meeting to order and addressed the members as follows:

GENTLEMEN:—When we adjourned our mid-year meeting, held on the 19th of July, at the Sherman House, in Chicago, it was to meet again on this day, the first Tuesday in March, in the beautiful, enterprising and progressive city of Omaha, and as your presiding officer it becomes my duty, and I have the honor of addressing you at this meeting, which has for its object the advancement of the cut-stone contractors' and quarrymen's interests, offering an opportunity to its members for expression of opinion, discoursing upon theories, methods and subjects affecting the welfare of our organization, and the well-being and prosperity of its members, and the ways and means of putting the same in effect.

In formulating my address for this occasion I have sought to embody such subjects as are of interest to the trade, and while the field is vast and many the themes, I will speak only of those which are of immediate interest to you, and hope I may succeed in making our needs sufficiently apparent to warrant their being taken up at this meeting and generally discussed, and beg you to overlook its shortcomings.

I will begin with the subject which is nearest to us all—the condition of the building business in this section of the country—the garden spot of America—just now severely quiet. I am sorry to say that the past twelve months have been fraught with little good to the trade, private enterprise has lagged, speculation laid dormant, and building ventures were few and far between. No demand, no inducement for capital to free itself for the erection of store or warehouse, office building or bank, tenement or dwelling, so long as that familiar sign "For Rent" is so conspicuously displayed along the streets and avenues of our Western cities. Consequently those among us who wanted something to do for their workmen had to strive to get a share of what little public work was offered, such as postoffice buildings, court houses, school buildings and colleges, and by reason of excessive competition was bid for and taken at a figure, in many instances ridiculously low and exceedingly unprofitable, and as long as this condition of affairs exists we need not expect a change for the better. Localities east and west of us, notably Chicago and St. Louis, have been more fortunate and cut-stone contractors have an abundance of work, mechanics steady employment at the highest wages, and this situation has had the result of drawing away from the Missouri Valley about all of the best stone-cutters who had made this section of country their home, men who have heretofore found steady employment in our shops. These same men, who while in our employ had renounced their allegiance to the stone-cutters' union, independent as to their individual action, free to go and free to come, the masters of their own inclinations, were now brought face to face with the fact that they must, when again seeking work in Chicago and St. Louis, become members of the stone-cutters' union, and the most of them joined; what else could they do, we had no work for them. Some of these men still have their homes and families among us and would much prefer being here, and the question arises, When we again have work and these men apply how shall we deal with them? Shall we say, no, you must first renounce your allegiance to the society, or shall we forbear and take them back asking no questions—bear in mind that most of these men again joined the union from sheer necessity, because we could not give them employment and it was their only alternative. This is a subject which should be discussed at this meeting, and I trust that the result of your deliber-

ations will partake of a charitable view of the situation. Later on, when you can assure your workmen as steady work as they can get elsewhere, it will be well and proper for us to discourage those men being members of the union.

The dearth of work in this section and the consequent exodus of stone-cutters has brought us face to face with the problem of how shall we obtain men when we need them. The aim of the stone-cutters' union is to curtail the supply, limiting the number of apprentices in a shop to a possible two, directing legislation to prevent an influx of workmen from the old country, and thus become masters of the situation. While an Auchmuty, in New York, and a Pratt, in Brooklyn, are doing noble work in educating apprentices and preparing them for many trades, for some reason, perhaps because years of practice are essential for learning our trade, or they may find it difficult to supply suitable prices of work, or for some other cause, they do not, from my personal observation, appear to be successful in graduating, as it were, apprentices as stone-cutters, and it still devolves upon the bosses to take boys and make stone-cutters of them, and this is what we should do, and do it well! We in our own shop take able-bodied, intelligent boys of fifteen or seventeen years of age, give them a fair trial during a period of four weeks, without compensation, and if at the end of that time he has proven himself apt we contract with him and his parents or guardian, for a four years' apprenticeship, he to supply himself with all necessary tools, that he may learn to exercise care in keeping them together and in proper condition, pay him fifty cents per day the first year, seventy-five the second, \$1 the third and \$1.25 the fourth, also credit his account with ten cents per day the first year and twenty-five cents per day the second, third and fourth year for each day he has worked. The money retained, which has been placed to his credit, is paid to him or his parents at the end of his time, conditioned upon a true and faithful performance of his contract, and his loyal bearing toward his employer, we agreeing to instruct him in the art and trade of a stone-cutter. The boy is advanced as rapidly as possible from plain surface work to moldings and more elaborate work, not omitting to occasionally give him a piece of ramp and twist and circle upon circle toward the end of his term, under careful supervision of the foreman, and if he exhibits an inclination toward ornamental work and seems gifted in that direction, we place him side by side with a professional carver, under whose direction, beginning with roughing out for him, he may obtain at least a sufficient knowledge of that art, to be of frequent service to himself at a later date, even if he should not decide to follow carving as his trade. If at any time he lags in his work or becomes negligent we put him to jointing window and doorsills by way of punishment, and where there are a number of apprentices employed in the same shop this method usually has the desired effect. The last boy engaged has to pick up the patterns and straightedges, collect and distribute tools from the blacksmith shop, sweep out foreman's office and run errands, doing these things as much as possible before eight in the morning and after five in the evening. We engage them to work ten hours, although obliging them to work only eight, same as the journeymen, except in case of an emergency and we don't use them as laborers. It pays to give much time and attention to your apprentices, they soon learn to appreciate what you are doing for them, and strive to excel in the quality and quantity of work they perform, and besides you are only doing your duty toward them, and find a further recompense in seeing him leave your shop, at the end of his term, a credit alike to himself and to the shop, confident in his ability and in being able to answer the boss' question, to whom he may apply for work, "Are you a stone-cutter?" with an affirmative: "Yes sir, I am!"

Now, gentlemen, I see one way out of our prospective difficulties in the labor problem before us: Employ as many apprentices as you can properly take care of, give them a proper training, either in person or through your foreman, who should also be thoroughly alive to the situation, be painstaking with them, advance them with all possible speed, and my word for it, in two years you can already have a fairly serviceable new crop of stone-cutters, quite efficient and necessarily loyal to the bosses.

The time will come in this section of the country, possibly within a year, when the scarcity of stone-cutters will be felt, already, perchance one of us needs a few additional stone-cutters; we experience considerable difficulty in obtaining them. Wages are not as high in the Missouri Valley cities as they are in Chicago or St. Louis and I would therefore offer the suggestion that this meeting canvass the propriety of permitting members to pay stone-cutters as high as fifty cents per hour.

It is indeed a sorry state of affairs when it becomes necessary to organize as we bosses have done, and resolve that our workmen, free and independent citizens like ourselves, shall not do likewise, but so long as the society permits a noisy, domineering

and bulldozing element in the union, an irresponsible class of men, possibly only temporarily employed in the shop, to dictate, make and enforce arbitrary rules for the guidance of men long employed, contented and well-to-do, so long as there exists an arbitrary "walking delegate" and a supreme "shop steward" who dictates how we shall run our business, whom we may or shall not employ, so long are we by dire necessity, by sheer force of circumstances forced to uphold our organization and battle theirs.

At present, no doubt many members give expression to the remark, "What good is done by our organization; wherein do I derive a benefit from being a member?" The fact is that the very existence of our organization has given us indemnity, offers security, independence in management and control of our business, the more apparent as times grows better. Without the organization you would very soon again be at the mercy of the stone-cutters' union, and then waiting because you did not have the help or assistance from the pioneer association, the "Missouri Valley." Do not for a moment allow yourself to drop into fancied security, let better times, stimulating building operations come again and you will soon appreciate the value of the motto, "In union there is strength," and wish for a strong organization at your back, not for the purpose, I take it, to keep down or lower wages, for that effort would prove futile, besides our business is never more prosperous and we make the most money when wages are high, besides supply and demand regulate wages. No, it is for another purpose that we should uphold our association and never lag in supporting it. You will retain control of that which you alone should have a right to manage; you will be in condition to say that an applicant for work can get employment in your shop without first asking permission of the shop steward; you can discharge a workman without being questioned as to your motive; you can give employment to aged or infirm, or not thoroughly efficient stone-cutters if you want them, paying them according to their efficiency, and not be threatened by a strike for violating a shop rule; you can pay men according to their worth, making a distinction between good, bad and indifferent workmen giving him, who by reason of his superior capabilities, his expert manner of handling his work and tools, the highest wages and thus encourage others, yes particularly and foremost, your apprentices, stimulating them to strive forward that they may also occupy a place in the front rank and obtain the pay which their superior labor deserves. You can when a parent comes to your shop, a bright lad at his side, inquiring and anxious, desiring his boy to learn a trade, that he may become a capable workman, a useful citizen, earning an honest livelihood, upon whom he may lean in his old days, you can, I repeat, if the situation warrants, give him the much sought for opportunity, even if you already have the allotted "two apprentices" in your shop and no one will say, "strike!" Gentlemen, look back, I say, to the time when there was no Missouri Valley Association and consider that precisely the same condition of affairs will exist if you fail in your allegiance now, and herein alone I argue is a sufficient recompense for being a member of this organization.

Concerted action exercised judiciously may correct existing evils, such as are detrimental to the interest of the cut-stone contractor, while an effort in the same direction made by an individual would most likely fail. A subject of this nature, for instance, is the deplorable practice of a quarryman supplying his product either in the rough or sawed to contractors who are not in the cut stone business. This is an important matter and one which your association can correct, and in my opinion a resolution covering the case passed at this meeting would have the desired effect, and while speaking of quarrymen I desire to say a few words concerning that branch of our membership, and the relative duties of one toward the other.

Our membership consists of two distinct classes, the cut-stone contractor, such as are regularly engaged in the cut-stone business, and quarrymen, engaged in quarrying stone and supplying the same to the cut-stone contractors. The quarrymen are indirectly interested and prospectively benefited by reason of their membership, and relying upon the most natural of ties, that of fellowship, and the consequent familiar acquaintance begotten by friendly association, succeed in entwining our hearts and obtaining a full measure of our good-will. You will please bear in mind that the membership of cut-stone contractors is comparatively small, and that the quarryman is a very necessary and important factor of our organization, contributing largely to its support, thus aiding and assisting the cut-stone contractor, while on their part not calling upon us for assistance in matters of their own. Now it is but natural and to be expected, that he, the quarryman, he that has been loyal to our principles, occasionally, when in a reflective mood, might be somewhat skeptical on the subject and ask himself the question: What benefit is the organization to me? Permit me to answer him, and say

that it is our undoubted duty to encourage those who assist us; as far as possible give your orders for material to those who are members of the Missouri Valley, who are quarrymen and quarrymen only. Not alone do this, but assist in encouraging the use of the materials quarried by them; advocate their cause; let your dealings, especially with them be fair and honest; have an eye to their interest where it may be of service to them; make them feel that you appreciate their assistance and their interest manifested in our behalf, and, believe me, if ever the time comes when we may be sorely in need of help, none will be more liberal, none more prompt in assisting us than our fellow members, the quarrymen.

I also wish to call your attention to the monthly reports which should again be sent out to members beginning the first of April, and in this connection I would ask the members to give the subject prompt attention, so that the interesting and important information thereby collected and so ingeniously tabulated by our secretary can be distributed and thus enable each member to see where idle workmen are to be found. The dilatory and neglectful manner in which these reports were returned in the past almost entirely destroyed their usefulness. I trust you will take the few minutes' time necessary to fill them out and promptly return them to the secretary in the future.

It has been thought best to hold our annual meeting as late as the first Tuesday in March, as by that time cut-stone men would be supposed to be better informed as to their needs, more familiar with the prospect for the season and in better shape generally to talk to quarrymen who are present at the meeting. The annual meeting should, however, extend over a period of two days, thus giving members an opportunity of exchanging views concerning affairs of mutual interest, the chance of social intercourse and yet, not infringing on the time necessary for the transaction of association business.

I desire to say something concerning a national association of cut-stone contractors. The effort in that direction, which had its inception at the time of the meeting of the National Association of Builders in St. Paul in January, 1890, at which time and place were congregated more cut-stone men than probably had met at one time before, was, and has proven to have been an abortive effort, possibly a failure as much from the fact that a premature and impromptu-framed plan of organization was adopted, with purpose and manner of working not clearly defined, and forcing the duties of secretary, the most important office, upon a gentleman whose time was wholly absorbed in his own business, and finally giving up the ghost at St. Louis in January of last year when less than one-half dozen individual members responded to the call. At that time there existed but one organization of cut-stone contractors, and that one our Missouri Valley, now there are several: The Missouri Valley, the Ohio Valley, the Detroit Association and the Alleghany County. These associations could form a nucleus around which others would soon rally as soon as organized. I believe it will soon be possible to put upon a proper footing a national association composed of local bodies affiliated for purposes national, and yet separate as to matters appertaining to local affairs, standing very much in the same relationship to each other as do the states to the national government, each local body being represented in the national organization by delegates, and the board of directors being composed of, say, the presidents of the local bodies.

An association of this kind when fully organized, representing the cut-stone interests in various parts of the United States, could wield considerable influence, direct favorable legislation, assure us more prominence and standing, commend and win for us more respect, bring about the possibility of contracting directly with the owner, more effectually battle the penitentiary evil, and in league with kindred organizations secure the passage of a national lien law governing in all states, so plain in its workings that it would prove a boon and a protection indeed. I am not willing to acknowledge that the organization of such a body in the near future is not possible, and would like an expression from members upon this subject when the proper time arrives in our meeting.

Finally, I consider it proper and in place to heartily commend to our members and their friends our official organ, *STONE*, a most interesting publication, alike of service and benefit to the contractor and workman, whose pages teem with a fund of varied, instructive and useful information for the benefit of the general reader; a work containing well-written articles of especial interest to our trade, its very existence reflecting credit upon the stone industries it so ably champions.

In conclusion, I trust that we may all profit by personal contact, and that the friction



PFEIFFER.

produced will warm, brighten, cheer and buoy each member present, and that before adjourning each and all will declare that it is a benefit to be a member of the Missouri Valley. I thank you, gentlemen, for your kind and patient attention and hope you will all experience an enjoyable and pleasant time, and that we may all meet again, twelve months hence, with brighter prospects before us.

At the conclusion of his address Mr. Pfeiffer was vigorously applauded and later on the matters suggested therein were taken up for discussion. The minutes of the previous meeting were read and approved. Secretary Emery made his report, which was adopted, as was also that of Treasurer Drexel. Adjourned until afternoon.

AFTERNOON SESSION.

Called to order at 2:30. President Pfeiffer referred with considerable feeling to the death of one of the members, David Pullman, of Kansas City, and on motion of Mr. Abercrombie a committee was appointed to draft suitable resolutions. The president appointed as such committee Messrs. Sutermeister, Emery and Cuthbert who submitted the following:

WHEREAS, Providence by its all wise designs has called from our midst David Pullman, a man whose courage, perseverance, integrity and manly qualities made him a leader among his fellow men, therefore, be it

Resolved, That the Missouri Valley Cut-Stone Contractors' and Quarrymen's Association has by his death sustained an irreparable loss.

Resolved, That our sincere and heartfelt sympathy be tendered the widow and family of our deceased member.

Resolved, That these resolutions be spread upon the records of the Association, published in the official organ, *STONE*, and a copy suitably engrossed be delivered to the widow of our lamented friend as a memorial of the esteem with which her noble husband was regarded.

A. SUTERMEISTER.

W. E. EMERY.

JAMES CUTHBERT.

Mr. Schall spoke at length regarding the inexpediency of holding semi-annual meetings and submitted the following amendment to the Constitution and By-laws:

AMENDMENT TO ARTICLE I, SECTION 1, BY-LAWS.

The regular meeting of this Association shall be held annually on the third Tuesday in March at such place as may be designated at previous meeting. At this meeting the officers will make their report for the year, and the election of new officers take place.

Carried unanimously.

A discussion was then had relative to the matter of fines for non-attendance. The discussion participated in by Messrs. Abercrombie, Ulmer, Sutermeister, Bruce and Emery resulted in a motion that same be abolished. Carried.

Mr. Emery spoke in reference to his system of reports, which were intended for the guidance of members seeking additional help. The advantages were logically set forth and better understood, resulting in a motion, by Mr. Schall that reports continue to be carried out. Carried.

A motion by Mr. Abercrombie prevailed that the matter be left to a committee to be appointed at the next meeting, Mr. Pfeiffer to be chairman of same.

The matter of employing union labor was then taken up and on motion by Mr. Schall, seconded by Mr. Ulmer, it was resolved that no question be asked of applicants for positions as stone-cutter, regarding their connection with labor unions.

A scale of prices having been decided upon at a previous meeting to care

for the exigencies of the times, it was decided upon motion of Mr. Schall that same be continued and that wages be paid commensurate with good work.

Complaint having been made that finished blocks from the quarries were being sold to contractors who were not regularly engaged in the cut-stone business a motion prevailed that a committee of five including two quarrymen be appointed to draft resolutions expressive of the sense of the meeting. Messrs. Schall, Lauer, Cuthbert, Bruce and Worthy were appointed as such committee and submitted the following resolutions:

Resolved, That it be mutually understood that the Cut-Stone Contractors, members of this Association, agree to buy the product of the Quarryman or Quarrymen members of this association: provided, the material needed by them is produced by a Quarryman or Quarrymen who holds a membership in this Association; and be it further

Resolved, That the quarrymen members of the Association will not sell either directly or indirectly to Cut-Stone Contractors or others who are not members, in the cities and towns within the Missouri Valley District where there are members of this Association; that the Cut-Stone Contractors of this Association will in all cases give the preference to Quarrymen who are not engaged in the cut-stone business.

That it shall be the duty of any member becoming cognizant of any breach of the foregoing resolutions to at once notify the secretary, who shall lay same before the executive committee and the members be at once notified of action taken thereon.

Adopted and ordered published in the official organ, *STONE*. Adjourned until following morning.

WEDNESDAY MORNING SESSION.

Called to order at 9 a. m. Moved by Mr. Ulmer that the list of members be printed for distribution and that the trades be designated; the particular product of the quarrymen members being stated. Carried. Moved by Mr. Abercrombie that the rules be suspended and order of business altered. Carried. Mr. Abercrombie submitted the following amendments to the constitution and by-laws, which were acted upon separately:

Be it resolved, That section 1 of article 4 be amended by striking out the words, *an owner or contractor*, and inserting in lieu thereof the words, *another member of this association*, so that the section as amended will read:

Article 4, Section 1.—If a member has any difficulty to collect from another member of the association for material or cut-stone furnished, said party or parties shall be notified by the secretary of the time and place to appear with the creditor, before the board of arbitration, to have such claim investigated, and if found correct and not promptly paid, our members and quarry owners will be notified that said party is not entitled to credit from the members of our association.

Adopted.

Resolved, That a new section be created and added to article 4 of our by-laws to be known as

ARTICLE IV.

Section 3.—If a member of this association has any difficulty with an owner or his agent, or a general contractor, and said member desires the assistance and protection of this association, he shall immediately notify the chairman of the board of arbitration of the trouble existing and request the board to arbitrate the same. When the chairman of said committee receives such a request he shall cause the secretary to notify all members of the association in that locality to refrain from furnishing any labor or materials to such owner, his agent or general contractor, until a copy of the decision of the board of arbitration is transmitted to the members where the trouble exists, when they shall govern themselves accordingly.

Adopted.

Amend section 3 of article 7 of the by-laws by striking out the entire section and inserting in lieu thereof the following:

ARTICLE VII.

Section 3.—Any member violating any of the articles herein contained shall be brought before the executive committee, who shall deal with the case as they see fit and proper. They shall have the power to inflict such penalties as they may agree upon on a four-fifths majority vote. They may recommend to the association the expulsion of a member, at an annual meeting, and if the said report is adopted by a two-thirds majority of the members present the member shall stand expelled.

Adopted.

ORDER OF BUSINESS.

(1.) Call to Order; (2.) Roll Call; (3.) Reading Minutes of Last Regular Meeting; (4.) Report of President; (5.) Report of Secretary; (6.) Report of Treasurer; (7.) Presentation of Applications for Membership; (8.) Balloting on Election of Members; (9.) Report of Executive Committee; (10.) Report of Arbitration Committee; (11.) Report of Special Committees; (12.) Unfinished Business; (13.) New Business; (14.) Election and Installation of Officers; (15.) Selecting Place of Meeting; (16.) Adjournment.

Amend section 2 of article 4 by striking out all of said section and insert in lieu thereof the following:

The dues shall be ten dollars per annum, payable in advance at each regular meeting.

Adopted.

A discussion took place relative to the entrance of the St. Louis Cut-Stone Contractors into the association it having been ascertained that official recognition of them by the Ohio association had been altered since the last meeting. It was decided to invite them to join. The reference to the formation of a national association of cut-stone contractors in President Pfeiffer's address provoked a lengthy debate participated in by Messrs. Emery, Schall, Rowley *et al.* The discussion ended by the following resolution being offered by Mr. Abercrombie:

Resolved, That it is the sense of this organization that we favor the organization of a National Association of Cut-Stone Contractors to be composed of the different local organizations now existing and others which may be organized, and that the secretary be instructed to correspond with the other organizations on this subject.

Carried. Adjourned until 2 p. m.

AFTERNOON SESSION.

Called to order at 2 p. m. The auditing committee made its response as follows:

The undersigned have examined the books and vouchers of the secretary and treasurer and find them correct.

OMAHA, Neb., March 8, 1893.

A. SUTERMEISTER.
WM. WHISKER.

A further amendment to the constitution and by-laws was offered by Mr. Abercrombie:

Strike out entirely section III of article II.

Amend section 3 of article II to read as follows:

ARTICLE II.

Section 3.—The secretary shall keep a correct record of all meetings of this organization, collect all moneys due the association, pay the same to the treasurer and take his receipt therefor; draw all warrants on the treasurer, which must be signed by the president; keep correctly the accounts between this association and its members and perform such other duties as may be ordered by this association or its executive committee. He shall receive as a compensation for his services the sum of three hundred dollars per annum, payable quarterly.

The application for membership of W. Wenisch, St. Paul, Minn., was read and accepted. St. Paul, Topeka and St. Joseph were placed in nomination for next place of meeting the choice falling upon St. Paul.

The following were nominated as officers for the ensuing year and elected unanimously: President, Chas. A. Pfeiffer, St. Joseph, Mo.; first vice-president, Lawrence Bruce, St. Louis, Mo.; second vice-president, A. Sutermeister, Kansas City, Mo.; secretary, W. E. Emery, Bedford, Ind.; treasurer, Henry Lauer, St. Paul, Minn.

Moved by Mr. Abercrombie that the secretary be instructed to have the new constitution and by-laws printed. Carried. Adjourned.

EMPLOYER AND UNIONIST.

A DEBATE on the labor question took place at Worcester, Mass., February 9, between O. W. Norcross, of Norcross Bros., of that city, the largest granite and stone contractors and builders in New England, and Geo. E. McNeil, of Boston, a well-known advocate of trades unionism. The affair was given under the auspices of the board of trade of that city, and the jury consisted of five gentlemen selected from the board and five from the Central Labor union. We give below the essential points of the argument of both sides, as reported by the Worcester *Telegram*.

MR. NORCROSS.—"The labor question which brings us here to-night, is one which demands the most careful consideration, and unless carefully handled and settled on principles of justice and fairness and wisdom, is likely to cause great disaster to our country. Differences arising from it have, within a few years, caused a loss of many lives and millions of dollars worth of property. Twice within the past year we have seen the necessity of an armed force to quell disturbances arising about it. We must consider all labor from a different standpoint. Some machines have multiplied the product of men's labor thousands of times. The new condition of things we must meet, and it is not fair or right that it should be left entirely to the consideration of the man who is doing the manual work. Out of the desire for a better condition of things have grown labor agitations, troubles, organizations, coöperative societies; also out of it have come the great gifts of money, schools, libraries, parks and a general anxiety for the welfare of all which is shown by such works as the Boynton school, Jaques hospital, Cooper institute, the Auchmuty trade schools, the Tilden library, Carnegie's gifts, the university of Chicago, our Institute park, the park at the lake, the lookout at the lake. All these are doubtless necessary for a wise settlement of this important matter. The man who has been obliged to work in Europe for his bare living comes to the United States and earns three times as much. Straightway he thinks he is much abused and acts accordingly. There are doubtless many cases where labor is not fairly treated and the man that holds it is right to hire others at the lowest possible rate, is certainly as wrong as the most extreme on the opposite side. There are also very many cases where capital, enterprise and the interests of employes who have spent their lives in pushing a great business, are in their turn oppressed by the exactions of the trade unions and organizations, and the rule seems to be that unless the greatest care is taken in selecting help that the more liberal dealing labor receives as a class, the more unreasonable its exactions become."

After quoting from the constitution to the effect that it is every man's right to acquire, possess and protect property, the speaker pointed out that the humblest individual owned, for all practical purposes, Lake Quinsigamond Lake park of 150 acres and so many parks around Worcester that he could not walk far in any direction without coming into one. Mr. Norcross then reviewed the origin of the discussion which, he pointed out, arose from his smoke talks in the Builders' exchange and from subsequent interviews. He proceeded: "My first point was that we have no great strikes that are right." He referred particularly to the strike at Homestead, the freestone cutters' strike of a few years ago, the carpenters' strike in Worcester for eight hours a year or two ago, and to the granite cutters' strike on May 2.

"One particular point of the Homestead strike," he said, "was a demand for \$5.25 a ton, at Homestead, for the same work which, four miles away, was being done by members of the same organization for \$4 and at Susquehanna for \$3.60 per ton. The freestone cutters' strike of two or three years ago turned on the point that the cutters decided that no man should work who did not belong to their union or society, and then decided that no more men should join their union. They decided that the union must say who should and should not work at freestone cutting, that the foreman in a man's shop must be a member of their union; that no apprentice should learn a trade without the permission of the union and that they would prevent any man from working, unless he chose to pay anywhere from \$5 to \$200 for joining the union."

The speaker referred to the foolishness of the carpenters' strike in Worcester a few years ago for eight hours, when everybody else was working ten, and pointed out that the carpenters in the Norcross shop began to work nine hours a day a month before the carpenters' strike was ordered. He added that the granite cutters at Stony Creek struck May 2, in violation of an agreement by which either party was to give three months' notice. Referring to the statement in the *Telegram* interview that some leaders of labor organizations are vicious. Mr. Norcross said:

"The term vicious was used in the sense that a man is vicious when his actions are imperfect and contrary to moral principles or law, and that any leader who inaugurates and leads a policy that is damaging to the general prosperity of the country, as well as to the workmen themselves, we may consider vicious and just in proportion to the power he wields, if he wields it wrongfully."

After a tribute to the fairness of the constitution of the Knights of Labor, Mr. Norcross said they had always been able to settle any difference with that organization by agreement or arbitration. He added:

"There has been no case of difference between our firm and any union where an examination will not show that the union has infringed upon personal liberty or violated personal laws."

Mr. Norcross then discussed the constitution and by-laws of the granite cutters' association, and observed that no man had the right to oppose anything urged by the National association of granite cutters without being considered a criminal. He pointed out, also, that differences from twenty-seven to thirty-four cents an hour exist in places not twenty miles apart; in some places one apprentice to thirteen men, in others one apprentice to four men.

"I will call particular attention," he added, "to the fact that in Boston and Quincy 1500 granite cutters can see their way clear to work under what may be called a fair arrangement, but in Milford, twenty-five miles away, the men are not allowed to work under the same arrangement, the only reason given being that men are allowed to work who do not belong to the union or that more than one apprentice to thirteen men is employed. Certainly a leadership which refuses to the workmen in Milford exactly the same conditions as in Quincy and Boston, may be called vicious."

"I have said: 'They consider it right to murder men who don't belong to them.' I will simply refer to the affair at Homestead, and to the fact that immediately after some of the principal men who took an active part in it came to Boston to solicit help, and were received and indorsed by some of the labor unions."

In reference to his charge that the union prevented boys from learning a trade, he pointed out that in the spring of 1892 the granite cutters of Worcester tried to restrict the number of apprentices who should learn a trade to one boy to thirteen men, and added that the practical working of the rule would allow only one boy to thirteen men in any useful occupation.

"As an example of how this rule would work," Mr. Norcross proceeded, "I will say there are thirteen granite cutters in Worcester, whom I can name if desired, and these men have by industrious effort raised among them forty-five children, of which the ratio is twenty boys to twenty-five girls. You will notice that although these men have brought into public notice twenty boys, they have decided that only one of these twenty shall learn any useful occupation. I would ask the committee to decide what must be done with the other nineteen, and whether the men who hold such doctrine are not vicious."

Mr. Norcross showed how nearly \$3,000,000 had been lost in New England alone through the granite cutters' strike, and showed also that, for the same reason, a cheaper variety of stone was being used for public buildings in various parts of the country.

He then took the Norcross pay rolls up to May 2, and showed that some 300 granite cutters were at work for \$3.06 per day, and 180 quarrymen at from 17½ to 22 cents per hour. He called attention to statements by the men themselves that they had no fault to find with the wages, sheds or any other particular.

"These men, received \$3.06 per day for nine hours' work. I would like to ask the Central labor union whether or not they consider that fair remuneration compared with what is usually paid?"

Notwithstanding this Mr. Norcross pointed out that there had been a strike at Stony Creek every year for the last four years, and expressed the opinion that these had kept wages down, restricted business, and worked great damage to the granite industry. Then he asked if he was not justified in calling the promoters of these strikes vicious. After expressing himself in favor of an eight-hour working day, Mr. Norcross showed how New England is easily the greatest granite producing center in the country.

"But, the entire welfare of the granite industry seems to be in the hands of one man who, by misrepresentations, by a peculiar form of organization, and by deftly handling an organization formed in 1877, has continued for years to keep the business in a turmoil. The result is that during the last ten years New England, which should have trebled and quadrupled its granite products, if it could have had full swing, like some other business, has increased but 104 per cent. In Massachusetts the small increase is not the worst side of the question, for we find that the increase in the granite business is due to the trade in paving blocks and foundation stones, which gives to the entire output of this state an average value of not over 30 cents per foot, whereas our quarries devoted to the production of granite for the exterior of buildings would show an average value of the stone of nearly \$2 per cubic foot."

Mr. Norcross further pointed out that since the erecting of the Taylor building and the Mutual insurance building, both of granite, little had been done since, and that what Norcross Bros. had done had been in spite of the union and not by any help from it. He added that but for the granite disturbance, the postoffice in Worcester would have been built of granite instead of marble and remarked that the government during last year had put up but one large building of granite. The speaker then attacked the granite cutters' national union of the United States of America, the rule of which he said was: "Join us, or we will damn you in Milford; we will damn you in Worcester, we will damn you in Chicago."

Mr. Norcross pointed out that the members of the organization received from 25 to 75 per cent. more than the average artisan of New England and worked only nine hours a day, and yet its members saw fit to work in Boston for 31 cents an hour, in Quincy 27 to 30 cents, Providence 31 cents, Westerly 27 to 30 cents, denying at the same time an equal right to Milford and Stony Creek. In explanation of the recent lockout, Mr. Norcross said: "We consider that 300 men striking and leaving work in violation of their agreement was sufficient reason for a cessation of work on the part of fifty other men who were working in the same works."

In conclusion Mr. Norcross submitted his points as follows: That some strikes are unjust; that some strikes were unjustifiable; organizations led by vicious men; refusal to allow young men to learn a trade; that the granite strike had cost New England \$3,000,000; that in his opinion eight hours should constitute a legal day's work in a very few years.

MR. MCNEIL—"A trades union is a constitutional democracy, in which the rights of the minority are maintained by parliamentary rules. They are formed on the basis of that of the town meeting or town government of our United States, and submitting to only such control as the best interests of the whole shall demand.

"In most of the national unions the national officers are elected by delegates from the other unions. The laws of a trade union, as a rule, are the constitution. There is no such thing as a monarchical trade union. The Knights of Labor have a monarchical trade union and have a monarchical form of government, which is vested in the executive government. The granite-cutters' union is probably one of the most conservative of trade organizations. It gives less power to its national officers than any other; the power is held in the hands of the members. The charge of tyranny against the unions cannot be maintained. All danger comes from the concentration of power in the hands of the few, and not by the distribution of power through the hands of the many. The relation of the trade union to the non-unionist takes one of two forms. He must be treated as an alien or as a neutral. It is only when the non-union man takes the place of the unionist in a lockout or a strike that he is treated with enmity. The unionists endeavor by all lawful methods to compel him.

"The union cannot be responsible for the moral character of its members. In any case of public excitement law is often violated, and it ill becomes the employing classes to charge the trade unions with being especially amenable. Through all times we have found that the spirit of law breaking is not confined to the working classes. The mob that led the law breakers in New Orleans was officered and sustained by some of the best men of that city. My opponent, in the interview which led to the debates and in the smoke talks which led to the interview, made some statements that I wish to refute.

"The question for the people to consider is whether the methods of the trade unions are right. If strikes are sometimes justifiable then it is sometimes justifiable to strike. A trade union is sometimes as much a protection against members of the same craft as against employers. My opponent says that the leaders of trade unions are vicious men and he finds only two leaders to admire. I am sorry that his acquaintance has been so limited among them. Look at the list of trade leaders, and, as a rule, you will find they are men of brains. Who has a word to whisper against Samuel Gompers, a man of undoubted integrity, in whose hands the wealth of the Indies would be safe, a man with the tender heart of a woman. Look at Beith. I should like that the board of trade should look into the faces of the leaders of the labor unions, and I should like them to tell me if those men are not as good as the best men of the city of Worcester—men who had marched to Washington, men of the old 6th regiment; these are the men who were the leaders of the unions. I have a list here of about 50 names of men who were leaders of the unions, a majority of whom were born in the United States. And yet he says they were aliens!

"My opponent says in his interview, but does not repeat it to-night, that three men tied up the New York Central road. That is wrong. No three men, leaders of labor could tie up any railroad. That was a tie-up which was occasioned by the violation of a state law. And then the Homestead strike. That was no strike. It was a lockout, which occurred before a contract was finished. My opponent repeats the statement in a modified form that trade unions murder men, and he gives an instance. But the man who was charged with murder at Pittsfield was not a trade unionist. He was a member of the Knights of Labor, that holy organization which has been so eloquently pleaded for by my opponent. The granite-cutters' union, as I have said, is one of the most conservative. Their preamble says their object is to rescue the trade from the condition into which it has fallen, to secure it from further encroachment, and to elevate every stone-worker in the United States."

The speaker further pointed out that it was part of the rules of the granite-cutters' union not to decide upon anything in the heat of passion, but to postpone it till it should be passed upon understandingly. He then dealt with Mr. Norcross's statement that boys are not allowed to learn the trade, and said:

"This union guarantees to every local branch the utmost control of its own business. The charge is made that it is a grievance that in the town of Milford the citizens cannot control their own craft. The local branches decided the matter of apprentices. It isn't Mr. Dyer nor the national association that says it will be one apprentice to every twelve men. It isn't anybody vicious but the citizens of the towns of Milford, and Concord and so on. The day of apprenticeship has gone, and you needn't thank the trade unions that they have gone. My friend was not so anxious about apprentices, except when they were Italian apprentices, cheap men who took the places of union men. We do not object to his apprentices—we object to the pretense of the thing."

"I believe that all boys ought to be taught the dignity of labor—by laboring. But let me thank the board of trade of Worcester. You have opened up a way to show the method by opening your halls to the dignity of labor."

Pointing to the cigar trade, Mr. McNeil said: "It don't pay to have apprentices and my friend here wouldn't advocate a system of apprentices except to allow him to dictate prices. It is the employers themselves who have hindered men and boys from learning a trade. My opponent says they refuse to earn \$3 a day and consider it right to take a man's place who is making \$1.50 a day. That is emphatically untrue. A union man cannot take the place of another man. The instant he does that he becomes a scab. He may take a job at \$1.50 when he is locked out of a \$3 job. The men at Milford did that and by doing it showed themselves to be good American citizens. The charge of the dictation by union men is older than the fable of the wolf and the lamb. It is not dictation for a man to say at what wage he will work. I have skill and time and endurance to sell. It is my property. Haven't I a right to fix the price and the conditions for that skill and that time? It is a divine right as well as a human right. If it is my right, it is my right to do it in mutual protection of that right and that's the whole fundamental principle of labor unions and for an employer to send a bill of prices to a working man is an insult that labor unions will not much longer submit to."

"Some of my friends here smile at the idea of an employer conferring with his men in regard to the conditions under which labor shall be sold. In the earlier days the laborer was denied all the privileges of manhood. They organized secretly and by and by became the slaves of the land. Any man going beyond his jurisdiction was stamped as a vagrant. He had to fight for the baron, as well as to work for him. Passing from that system he became the slave of the law—not made by the granite-cutters, or by the unions, but by the gentry. In this country we are a slave to the law, as all men ought to be, in a certain sense, but we are also law makers, and 100 years of a republican form of government shows the wisdom and righteousness of the system. Every employer is possessed of the idea that he is the sole party concerned in the production of wealth. The sooner he learns that his rights are distinct, and the rights of his men equally distinct, the better.

"The statement that union workmen are not allowed to do the same amount of work sounds very well in theory, but is wrong in fact, and arises simply from the efforts of the employers to force a smart man to do an extra amount of work and compel the others to reach his standard. The labor unions are designed to raise workmen up to the highest standard, and not to lower it."

The speaker then took up Mr. Norcross' statement, that labor leaders are foreigners, and remarked that he did not suppose there were many men in the country who could trace their pedigree back to the Mayflower.

"These men," he added, "are citizens, and when there is a lockout the employers don't get citizens to take their places; they get the scum of civilization. Go and look in these men's faces—Hungarians, Poles and Russians. I haven't a word to say against them. They are imposed upon simply on account of their ignorance. You don't know of an American—a decent American, ever 'scabbing it.'"

Reverting to the troubles of the granite cutters again, the speaker said the New England granite manufacturers had convened and compelled a lockout because the men would not agree to an expiration of their term in December instead of March.

"This," he went on, "is a highwayman's contract. 'Sometimes the men that pay the highest wages make the lowest bid and get the contract. Our friend here—Mr. Norcross—has had the reputation of paying very good wages—the highest wages. He is an eight-hour man, and I am, and if he would only settle up this granite business tomorrow we would be good friends with him. He has made more money on contracts than any other builder, for he is called the king of the building trade. He has made his money on these contracts, and by the men who worked for him.'"

Recurring again to the charge of viciousness made by Mr. Norcross against the labor leaders, Mr. McNeil took up the case of the secretary (Mr. Dyer) of the granite-cutters' union, and said:

"That man has no more power over the Milford strike than I have. Milford can take care of itself and so can Stony Creek. He cannot say when a strike shall take place or when it shall be declared off any more than South Carolina can legislate for Massachusetts or rather Massachusetts for South Carolina as it ought to be. They hold him continually in office because he has never attempted any dictatorial powers, but has been their faithful servant.

"Take the cigarmakers' union. What can the president there do? The trouble is and the fact is, and I can convince our friend (Mr. Norcross) that the trade union leaders spend most of their time trying to prevent strikes or trying to settle strikes that have already occurred. The men sometimes blame the leaders for strikes in which they involve the leaders. The leaders of the unions are the conservers of the public interests. It is true, that, sometimes, when the men get hot-headed there are strikes which are unjustifiable, but Mr. Dyer doesn't provoke that strike. He simply carries to the men the voice of the National union. If they say 'strike' then the men strike and get support from the benefit funds. If, however, the National union protests against the strike and the men strike, then they have to support themselves. Now take the case of Milford. Our friend here—Mr. Norcross—suspended work because, he said, they were sending their money to Stony Creek. Hadn't they a right to do with their money what they liked? The agreement at Milford says that six months' notice should be given. My information says that about thirty minutes' notice was given. If there was any violation of contract the employers showed the example.

"I believe that employers have rights as well as employees, and the way to settle these is not to call my friend a tyrannical usurper or for my friend to call his opponents vicious men. Both are wrong. The only way is to come together, join hands together and consider the thing like brothers—not that one man should boast his millions and the other huddle in misery."

NEW ENGLAND NEWS AND NOTES.

THE stockholders of the True Blue Marble Company held their annual meeting in Rutland, Vt., recently. The officers' reports of the company's business were encouraging. The following directors were elected: J. W. Cramton, G. E. Royce, B. F. Pollard, A. Wurtenberg, Frank Huntress, G. B. Royce. At the close of the stockholders' meeting the new board of directors met, organized and elected the following officers: President, J. W. Cramton; treasurer, G. E. Royce; secretary, G. B. Royce; auditors, D. C. and B. F. Pollard. By the unanimous vote of the directors, George B. Underhill was made superintendent.

Charles C. Doe has been chosen one of the directors of the Black Mountain Granite Company. Their quarry is located in Piermont, N. H. This company is incorporated under the laws of Vermont with an authorized capital of \$100,000 and a paid-up capital of \$50,000.

Wm. Crombie, of Ayer, Mass., has sold his marble business to Messrs. O'Toole and Allen, of Clinton.

The total shipment of cut granite from Milford, Mass., the past year was 9,563 tons, as compared with 27,864 tons in 1891 and 22,000 tons in 1890. The smallest shipment was 412 tons in March, and the largest, 1,489 tons in August. The estimated amount of money paid out in wages in 1891 was upwards of \$600,000, and on a proportionate basis that paid out in the year just ended was only about \$200,000, a clear decrease of \$400,000 in wages from that of 1891. While the failure of the Darling Brothers affected the total somewhat, the principal cause of the decline can be attributed to the differences existing between employer and employed, which all hope may soon be terminated.

The S. E. and H. L. Shepherd Company has been organized at Rockport, Me., for the purpose of manufacturing lime and doing a general mercantile business, with \$100,000 capital stock, of which all is paid in. The officers are: President, S. E. Shepherd, of Rockport, Me.; treasurer, C. E. McIntire, of Rockport, Me. Certificate approved December 30, 1892.

The French Pond granite quarries are getting quite an amount of attention, and the idea of bringing granite to Woodsville, N. H., for cutting is a tempting possibility which the people are hopefully considering. There is little question but that a railroad can be built from Woodsville to the ledges with as little difficulty as from any other point, and to locate the cutting sheds there would be of great advantage in many ways.

NEW ENGLAND NEWS AND NOTES.

The contract for supplying the granite for the Gen. Grant tomb in New York has been awarded to the Maine & New Hampshire Granite Co., and is one of the largest granite deals of the year. At the Portland, Me., office of the company the fact was verified and it was thought that the writings in the contract would be signed soon. It includes the granite for the tomb, the surroundings, etc., and will go from the Maine quarries of the company at North Jay, a whiter granite than that of the North Conway and Redstone where the other works of the company are located.

The output of Rockland, Maine's lime kilns in 1892 is estimated at 1,400,000 barrels, which amount is considerably in excess of the average production of the ten years last past. The returns have not been entirely satisfactory, however, eighty-five cents a barrel for common and ninety-five cents for extra lump having been the ruling prices, and these are rather low figures. The companies, by proper coöperation, might have made the price five cents a barrel higher, which would have made a difference of \$70,000 in the total receipts. It is thought that the manufacturers will stand together in 1893 and maintain prices at a fair figure. Fifteen kilns are now in operation, and as the New York market is practically bare of lime, other kilns will soon be started up.

Samuel Henry, an employe of the Freestone Quarry Company at Cromwell, Conn., was almost instantly killed by a blast in the quarry. A splinter of flying rock entered his mouth, and came out through the top of his head. He lived but an hour and a half. He leaves a family.

The Connecticut Brownstone quarry, of Cromwell, Conn., has continued work during the winter, with the exception of a few days, when they were obliged to suspend on account of the extreme cold weather. The entire force of men have been given employment preparing for the spring shipment. The company will build a large stone saw-mill next summer.

Messrs. Barber and Thompson, of Niantic, R. I., have reopened the quarry at Hopkinton. The quarry is just across the river from Westerly.

The Bradford Granite Company, Concord, N. H., has increased its capital stock from \$1,150 to \$1,750.

A block of granite containing 360 cubic feet, weighing about thirty-five tons, has been brought from the quarries and unloaded on the site of the old Wells & Lamson sheds, at Barre, Vt. Messrs. Forsyth & Ingham are to make the stone into the first die for the Minnesota state soldiers' monument at Gettysburg. This is the largest die ever brought from the quarries. It is estimated that the whole monument when completed will weigh over 150 tons, with statue, and occupy fifteen cars for shipment. They have also contracted to build a larger monument for other parties.

At a meeting of the Granite Cutters' Union recently, at New Bedford, Mass., a schedule of prices for the year commencing May 1st was adopted.

NEW ENGLAND NEWS AND NOTES.

The men will work fifty-three hours per week, nine hours daily, with the exception of Saturday, when they will work eight hours, for thirty-four cents per hour or \$18.02 per week.

C. T. Barber, of Southridge, Mass., is now located at Providence and is meeting with good success in selling the treasury stock of the Deslauriers Slate Company.

The Vinalhaven, Me., Coöperative Granite Company expects to supply stone for the new public building at Camden.

The annual meeting of the Rutland White Marble Company, Worcester, Mass., was held recently in the company's office, in the Burnside building. The old board of officers and directors was re-elected, as follows: president, C. H. Fitch; treasurer, A. L. Burbank; secretary, C. H. Marble, of Rutland.

The Brandon, Vt., Marble Company, contractors for the outside marble work on the new Mormon Temple at Salt Lake City, Utah, sent away the last car load of marble required for the completion of the work, a few days ago. The floor tiles were all contracted for by the Corona Marble Company and finished under the superintendence of the senior member of the former firm, all the better portions of the work being finished by their own works. They have now in hand a very large contract for the new Clifton Springs Hotel, which will take many thousand feet of marble before completed.

A VALUABLE PUBLICATION.

"From the limited examination I have been able to give the pages of *STONE* during the year just closed, I consider it a most valuable publication to every one in any branch of the stone industry, and in its make-up it is admirable."—*W. H. McKnight & Co., Louisville, Ky.*

MUCH PLEASED WITH "STONE."

"I am very much pleased with *STONE*. To me its articles are both interesting and instructive, and I heartily commend it to all the trade."—*D. E. Denny, Nashville, Tenn.*

"*STONE* has been much improved. It contains such valuable information that I look for it anxiously when it is about due."—*J. Friday, Charleston, S. C.*

"*STONE* is a most excellent magazine, and should be read by every granite, marble and stone dealer in the world."—*W. C. Townsend, Zanesville, O.*

"I like your magazine very much. I find it useful, instructive and entertaining."—*Wm. Dickson, Sewickley, Pa.*

"It's a ground hog-case; we've got to have it,"—*Frank Fowler, Mankato, Minn.*

TRANS-ATLANTIC NOTES.

EUROPEAN public opinion inclines to the belief that nothing will be safe until the Chicago exhibition is fairly opened. This opinion will certainly be confirmed by the recent occurrence in the city of London.

For more than 200 years a stone figure of a boy seated on a pannier or baker's basket has stood in the Panyer alley near Newgate street. Upon it is the quaint inscription:

"When you have sought the city round;
Yet, still, this is the highest ground."

This stone was a cherished relic. Londoners had an affection for it. The stranger from other lands was brought to gaze upon it. It was one of the sights the country cousin was treated to. And now strict watch is kept on the Panyer stone for fear that it may be spirited away, and not without reason; for it is stated with authority that a certain rich American citizen offered fifty pounds to a laborer engaged in demolishing a wall in which the stone stood, if he would bring him the original stone and replace it by a replica. But the laborer was a true patriot. Nay, more, he was a thorough cockney born and bred. "What," thought he, "would London be without its Panyer stone?" "Perish the suggestion!" So the proffered bribe was rejected. Notice was given to the authorities and the precious relic is still safe and carefully guarded.

But if anything of interest or value is missed during the next few weeks the owner will search for it in Chicago, which is looked upon just now as the place to which everything naturally gravitates which is lost, stolen or strayed from the Old World.

I am told that one Old World production in the shape of Irish granite is likely to be heard of a great deal more in the near future. There is no reason why Irish granite should not compete with Scotch except the apathy of producers, or the lack of carriage facilities. The new system of railways which is now being laid down in the west of Ireland will shortly remove much difficulty on the latter score, and quarry owners seem to be growing alive to the trade which is now in their grasp. Granite equal to any Scotch in color and quality is now worked in the town of Galway and can be shipped from that port direct to New York and Boston. It is to be hoped that the trade will succeed. The lack of manufacturers has been severely felt in Ireland. As a consequence the bulk of the Irish people

TRANS-ATLANTIC NOTES.

have been forced to make a living out of agriculture. Every effort to establish manufacturing industries in the country is to be commended.

It is not likely that Scotch producers will allow the threatened competition to pass unnoticed. They possess indomitable perseverance in matters of business and in nothing has the quality been better displayed than in the recent discovery of "Rora" granite. This is a dark blue granite which is now being quarried at Rora near Peterhead. Previous to this discovery the manufacturers of Peterhead worked the red granite which they quarried in the immediate neighborhood of their works, but to execute orders for another color they were compelled to have the granite brought to Peterhead by rail then railed back, thus greatly adding to the cost of production. They endeavored to find a grey or blue granite nearer home but for some time without success. At last it was noticed that the aqueduct which carried an old canal over the Rora burn was roofed with long blocks of blue granite. Prospecting began about fifteen months ago and an extensive bed of firm rock was found at a spot where there was a copious spring water. Mr. Wilson in a paper recently read to the Buchan Field Club says: "My own experience in the case of inland quarries where blue and grey granite is sought, is that where there is no spring of water there will be no marketable rock found." A large quantity of excellent material has already been brought to the surface but the output is as yet limited. It is, however, expected that in the course of the coming summer the output will be largely increased and that "Rora" granite will then take a good position in the market.

Very different is the news from the Welsh granite quarries, where the trade is still in a depressed condition, but the Welsh slate quarry owners are still in the enjoyment of a prosperity to which for a long time they have been strangers. Prices were again raised at the beginning of the present year and best Welsh Bangor, 24x12 slates, are now quoted at 229 shillings per 1,260 slates at the quarries. At Llwydfoed a very fine bed of green slate has been uncovered and preparations are being made to do an extensive trade. Hitherto the green slate worked in the principality has been found in small isolated patches, but at Llwydfoed there is a mass of rock, all of similar color and texture, which is of great promise.

The Welsh slate quarrymen have recently obtained an advance in wages without difficulty, but in other parts of the country the relation between labor and capital are much strained. The masons at Cardiff are on a strike in consequence of a proposal on the part of the employers to modify the old rule "that no piece work or sub-contracting be allowed." It was suggested that in the future the rule should read: "That no sub-contracting be allowed unless the sub-contractor provides both material and labor." The men argue that piece work and sub-contracting leads to the farming of contracts,

WARNING TO DEALERS.

shoddy work, sweating, decreasing the number of hands, and the lowering of wages. On the other hand, the employers contend that they ought in the future to have full power to manage their own affairs as they think best, without prejudice to other rules agreed upon and to individual workmen.

Arthur Lee.

Warning to Dealers.

Editor of *STONE* Indianapolis, Ind.

DEAR SIR:—Below I give an account of the workings of a dead-beat, and I trust you will give same space in your valuable magazine at once, and thus let the trade on to him.

Yours truly,

ALEXANDER FRASER.

There is a dead-beat named "Meir" or "Fisher," or probably many other names, working our trade. His game is to buy a monument from a dealer and then make some startling remarks about having lost his pocket-book, and ultimately works the dealer to help him out. In many cases I have found out where he has got several \$5 bills, just in this way. The man is of Franco-German origin, medium height and build, sandy complexion and ordinarily well-attired. He was in this town and of course visited me, and likewise did me for a sucker. In my case of course he learned I was purely wholesale, but nevertheless he was equal to the occasion, and claimed to be a marble dealer, from New Riegel, O., I unsuspectingly sold the man some work, and treated him right in many ways, but at the first opportunity I referred to my Ohio list of dealers, and when I did not see any dealer in that town I then became suspicious. Investigating down town I was told that he had also done business with E. M. Wolff & Co., claiming to have been a farmer and in want of a monument for his daughter; to what extent he soaked Wolff I am not advised, but the villain got there no doubt. To prevent any immediate loss to any of my friends I took the precaution to mail numerous copies from the Mansfield *Shield*, but as the matter in it was somewhat confounding, the reporter not having got rightly the facts of the case I considered that I can do the trade more good by intimating through the medium of *STONE*, and trust that the next issue will find the rascal in jail.

Mansfield, O., Mar. 4, 1893.

MAINE SLATE AND ITS QUALITY.

To the Editor of *STONE*:

SIR—The article by Mr. Harris in February *STONE* is *very good* so far as Vermont goes, but he is wrong in the statement that Vermont slate is the strongest of any slate quarried—12,870 pounds crushing strain is right for Fair Haven, Vt., slate, by F. R. Hutton—but we have in Maine, by Prof. W. O. Crosby, the Williams slate, 29,270 pounds, and the Monson, Maine, Slate Company slate, 34,685 pounds.

Monson, Me.

Yours truly,

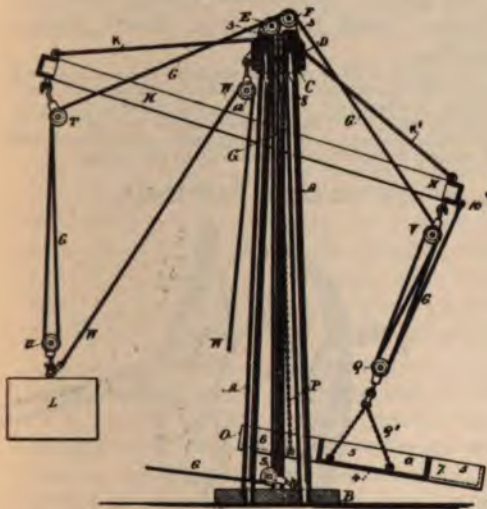
R. C. PENNEY.

"I can very freely express myself concerning the magazine. I have been a subscriber for *STONE* for one year and find it the best magazine published for the architect and builder, giving much valuable information as to strength of stones, etc."—*Cuno Kibele, Architect, Bluffton, Ind.*

RECENT PATENTS.

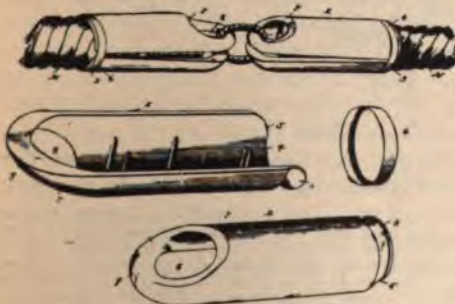
[The specifications under which patents are issued are, in most cases, too lengthy and technical for presentation in this department of *STONE*. The matter and illustrations in this department will serve to inform and instruct our readers as to the most recent inventions. Readers who desire full specifications of any patent can secure such by remitting to us a fee of twenty-five cents, designating specification desired by number and date of issue or patent.]

DERRICK.



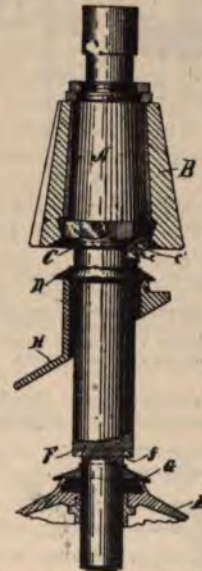
No. 487,453. James E. Serrell, New York, N. Y.; Mary J. Thomson, administratrix of said Serrell, deceased. Filed March 4, 1892. Issued December 6, 1892.

ROPE-CLAMP.



No. 488,348. Ozro J. Baldwin, Youngsville, Pa. Filed March 17, 1892. Issued December 13, 1892.

STONE BREAKING OR CRUSHING MACHINE.



No. 488,759. Ryerson D. Gates, Chicago, Ill., assignor to the Gates Iron Works, same place. Filed September 22, 1892. Issued December 27, 1892.

Claim.—The combination with a stone breaker or crusher of a gyrating shaft having a crusher head secured thereto, and formed with shoulders, one or more shoulders undercut at their lower edge to prevent or break the passage of water or moisture down along the shaft, substantially as described.

ARCH FOR CEILINGS OR VAULTS.



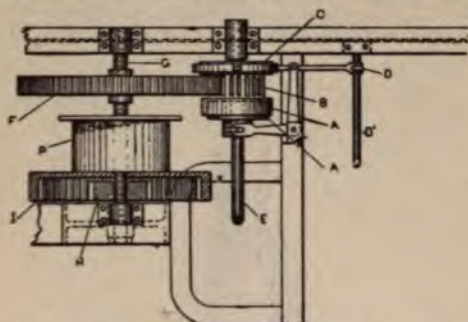
No. 489,654. Gotthilf L. Möckel, Doberan, Germany. Filed May 31, 1892. Issued Jan. 10,

RECENT PATENTS.

1893. Patented in Germany June 9, 1891, (No. 62,591).

Claim—In the construction of ceilings and vaults: The arches (*d e*), springing from the foundation at different points, intersecting at a certain height, and being both continued upward beyond the point of intersection, for the purposes as described.

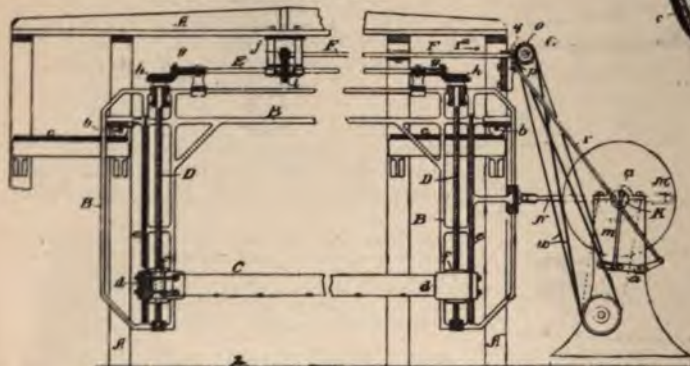
WINDING ATTACHMENT FOR DERRICKS.



No. 490,259. Edmond F. Atherton, Cleveland, Ohio. Filed September 5, 1892. Issued January 24, 1893.

Claim—In combination, a pinion loose on the driving shaft and a fiction device and brake, the gear F and pinion H fast on the shaft G, the pinion H' on the independent shaft K, the internal-gear I and the winding-drum attached thereto, arranged in the manner substantially as and for the purpose set for.

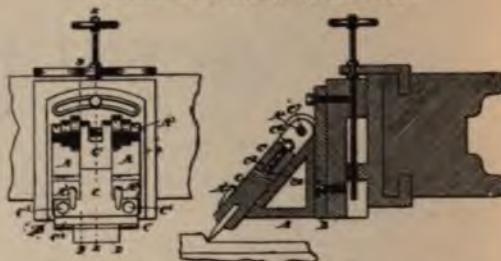
METHOD OF OPERATING DIAMOND STONE-SAWING MACHINES.



No. 490,464. George N. Williams, Jr., New York, N. Y., assignor of one-half to Benjamin A. Williams, same place. Filed March 7, 1892. Issued January 24, 1893.

Claim—In a stone-sawing machine the combination with a frame, a reciprocating sash mounted therein, and a sawblade provided with diamonds or the like, strained longitudinally in said sash and free to be pressed upward to a limited extent and means for feeding said saw blade to the stone in a positive manner on one stroke only, whereby on the return stroke the blade will be fed to the stone by its own resiliency, as set forth.

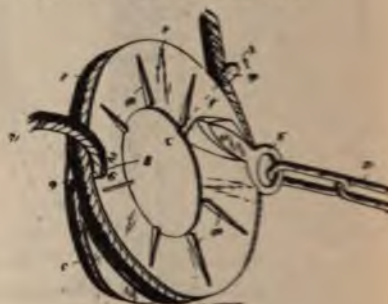
STONE-CUTTING MACHINE.



No. 490,721. Michael A. Pigott, Hamilton, Canada. Filed July 7, 1892. Issued January 31, 1893.

Claim—In a stone cutting machine the combination with the tool block A, having flanges A' and dogs A2, of the tool-holder C, comprising the parts C, C', C2, C4, and C5, the part C being swiveled to the part C', by the bolt or part C3,—the parts being constructed and arranged to operate substantially as set forth.

WIRE-ROPE FASTENER.



(No. 490,796.)

No. 490,796. Louis J. Widmer, Abilene, Tex. Filed June 21, 1892. Issued January 31, 1893.

Claim—The herein described rope fastener, consisting of a disk with a circumstantial groove and having a segmental obliquely positioned extension with a groove therein, and located on one side only thereof the end portions of the groove in the extension running into and across the groove of the disk below the level of the said groove in the said disk, and a hook secured to the said disk, substantially as and for the purposes specified.

BOOKS AND PERIODICALS.

"Logarithmic Tables" is the title of a new book compiled by Prof. Geo. William Jones, of Cornell University, Ithaca, N. Y., and published by MacMillan & Co., London. The book contains tables comprising four place logarithms, four place trigonometric functions, logarithms of numbers, weights and measures, addition-subtraction logarithms, lines and tangents of small angles, trigonometric functions, natural logarithms, prime and composite numbers, square cubes, square roots, cube-roots, and other tables, closing with errors of observation. The tables bear evidence of having been compiled with extraordinary care, and if one has occasion for the use of such tables, this volume supplies a want which most of us have felt, and felt seriously. Geo. William Jones is the American publisher and will forward full particulars upon application.

"The Secret of Character Building" is a new work from the pen of John B. DeMotte, A. M. Ph. D., and S. C. Griggs & Co., Chicago, have brought it out in a cloth bound, illustrated volume of 130 pages at the low price of \$1.00. This study of character building departs from the older forms of technical philosophy and seeks to bring it down to a basis upon which all can rest with some understanding of the subject under discussion. To accomplish this character is illustrated by comparison, and sound waves are taken as an example. In the book are very many helpful explanations of difficulties which have surrounded us all in our efforts to free ourselves from entangling influences, and the allusions to things common and well understood is a great assistance in arriving at correct conclusions regarding this important subject. This book is an illustration of the fact that it is not the subject itself which is difficult to understand, but that it is in a mass of technical language, the meaning of which only those familiar with the schools can grasp.

Worthington's Magazine for March is a royal number. Evidently this vigorous young magazine is growing and thriving, since, though exceptionally bright from the start,

each number steadily gains in interest, attractiveness and value, and its success in catering to the varied tastes and requirements of the American family at home proves its ability to give valuable points to many an older and more experienced periodical. A. D. Worthington & Co., Hartford, Conn.

The Chautauquan for March presents the following table of contents: "The Iliad in Art," by Eugene Parsons; "Exhibits of the Nations," by Richard Lee Fearn; "Usury Laws," by President Henry Wade Rogers; "The Influence of the Greeks on the English Language," by Prof. F. A. March; "Sunday Readings," selected by Bishop Vincent; "Scientific Phases of Mining," by Albert Williams, jr.; "The Navy of the United States," by H. W. Raymond; "American Seeds and Their Distribution," by George Ethelbert Walsh; "Boston Ideas for the Last Six Months," by the Rev. Addison P. Foster, D. D.; "The Jews and Anti-Judaism," by Anatole Leroy-Beaulieu; "New York's Police System," by the Rev. Richard Wheatley, D. D.; "A Romantic Career—Laurence Oliphant," by W. H. Withrow, D. D.; "The Evolution of a Summer Town," by George E. Vincent; "Bryant," by George Vance Cheney; "A Little American Republic," by Captain George P. Scriven, U. S. A.; "Ostrich-Farming," by Marcus Benjamin, Ph. D.; "Methods of Teaching a Primary Sunday School Class," by Mrs. James S. Ostrander; "Southern Women at Home," by Olive Ruth Jefferson; "Waisted Piano Practice," by Irene Hale; "Woman's World in London," by Elizabeth Robins Pennell; "Woo'd an' Married an' A'," by Anna Churchill Carey; "A New Departure in Dress," by Francis E. Russel; "The Mother of Napoleon." The editorials treat of Some Illustrious Dead, Southern Manufacturing Centers, the Catholic Ablegate. There are the usual departments devoted to the Chautauquan Literary and Scientific Circle.

The Overland Monthly for March contains three descriptive sketches of the Hawaiian Islands and its volcanoes, illustrated with typical scenes, entitled, "In the Wilds of Hawaii,"

G—Stone.

by Edward Wilson; "A Dead Volcano," by N. E. Fuller; "The Footsteps of Pele," by Mable H. Closson. A feature of the number is a weird story of medieval Paris street-barricades, illustrated by pen-and-ink sketches by the writer, entitled "Lauth," by Frank Norris. A plea for Silver, a paper highly spoken of by Senator Stewart, treats the subject thoroughly, and is entitled "Free Coinage of Silver," by John C. Henderson. An adventurous tale of two rides for life in Apache land appears in this number, entitled "A Scrap of Frontier History," by Charles Harkins. Illustrated poems and other fiction gives the number the usual Western flavor.

The complete novel in *Lippincott's Magazine* for March, "Waring's Peril," is by Captain Charles King, the laureate of our little army. The Journalist Series is carried on by Elizabeth G. Jordan, who tells "The Newspaper Woman's Story." It is illustrated. Charles Robinson furnishes an interesting account of "Some Queer Trades" carried on in New York, Philadelphia, London and Paris. Robert Edgarton writes briefly of Marie Burroughs the actress, whose portrait is given. C. H. Crandall objects to "The Selfishness of Mourning" and proposes the abolition of black garments as "a relic of barbarism." Louise Stockton puts "Our side of the Question," which is the novelist's side. M. Crofton in "The Men of the Day," talks of Thomas Hardy, Alma Tadema, Chief-Justice Fuller, and Russell Sage. The poetry of the number is by Edith M. Thomas, Florence Earl Coates, and Herbert Ditchett. There are two short stories both illustrated: "Hope Deferred," by Lillian A. North, and "A Rose of the Mire," by Kate Jordan. The latter is the first of a series of ten, one of which is to appear in each issue during the year.

Outing for March is an excellent number, containing many interesting articles of fiction, sport and travel, and, as usual, carries fine illustrations. The contents are as follows: "Chasers and Chasing in Ireland," by Capt. T. Blackwell; "Shooting in Japan," by S. Hartman; "The Flagellante's Sin," by Therese M. Randall; "Fishing Through the Ice," by Ed. W. Sandys; "Eider-Shooting in Cape Breton," by W. H. Mac; "Lenz's World Tour Awheel," "Track Athletics at Yale," by S. Scoville, jr.; "Through Darkest America," (concluded), by Mrs. K. White; "Yatching Around San Fran-

cisco Bay," by Chas. H. Shinn; "Militia and National Guards of Ohio," by Lieut. W. H. C. Bowen, U. S. A.; "Harry's Career at Yale," (concluded), by John Seymour Wood; "A Dog's Ghost," by Geoff; "The Tell-tale Mirror," by Herman Rave; "A Glimpse of the Northland," by F. Houghton, and the usual editorials, pomes, records, etc.

Every admirer of the beautiful in art should take advantage of the offer made by *The Home-Maker* magazine, which is giving a coupon to its readers that will help them to secure "A Yard of Chrysanthemums" and a magnificent photochrome of Tennyson, Bryant, Whittier, or Longfellow, all beautiful productions in three tints, and all well fitted to grace the walls of any home. This coupon is printed in the magazine. *The Home-Maker* magazine is steadily attaining an enormous circulation, due to its excellent articles, its superb illustrations, and, above all, its untiring efforts to secure matter of interest to every class of readers. People have discovered that they find everything, both practical and intellectual, in *The Home-Maker* for \$2.00 a year, and this is the reason why it is becoming one of the most popular and widely circulated magazines in this country. Its recent growth has been phenomenal.

A new addition of the February *Century* is now printing. The demand for the magazine this season has been very great. The publishers were for a time entirely out of the January number; and they are now printing this new edition of February which has been for some time out of print. The March edition, which had already been increased, proves still inadequate, and a yet larger supply is in preparation for April. Among the recent attractions in *The Century* have been Mrs. Burton Harrison's story "Sweet Bells Out Of Tune," Mark Twain's "Million Pound Bank Note," the reply of the Russian Secretary of Legation to George Kennan, Gen. Sherman's correspondence with his brother, Senator Sherman, the remarkable Reminiscence of Napoleon at Elba, etc., etc. The April number will contain an important article on the Chicago Anarchists by the Judge who presided.

The latest addition to the extensive list of journals of the building trades is the *Rock Plaster Monthly*, of New York City. At first blush one may marvel at the audacity of a pub-

FOR SALE, WANTED, ETC.

FOR SALE OR LEASE—Brownstone quarry on the L. E. & St. L. railroad. Address 290 Vincennes St., New Albany, Ind.

WANTED—SITUATION—As manager or foreman in monumental yard thorough practical marble and stone cutter. Turning; letter cutting of imperishable letters; also well up in the erection of monuments. Twenty-five years experience, thoroughly steady. F. L. GREENWAY, 328 Bergen St., Harrison, N. J.

FOR SALE—A developed granite quarry with first-class plant and equipment, well organized system of labor and established trade desires to add to its capital with a view to meeting the demands of an increasing business. To practical men an opportunity is offered for a profitable investment. Address X, care of STONE.

FOR SALE—A fine white lim stone quarry on easy terms. Railroad connections. For particulars address P. FRIEDRICH & SON, Box 12, Columbia, Monroe Co., Ill.

WANTED—Traveling salesman to travel for a wholesale and retail granite house; also twenty-five granite cutters. Address BRADDOCK GRANITE CO., 316 W. Markham St., Little Rock, Arkansas.

WANTED—Position as manager or foreman of cut-stone yard; have had experience in both hard and soft stone. Am successful in handling men, and can give any required reference. Address J. M. FISH, 33 W. Columbia St., Springfield, Ohio.

WANTED—Contract to furnish blood-red marble or yellow marble, of a hard, tenacious quality; any common thickness or length. THE JASPER MARBLE COMPANY, room 75 Sheldon block, El Paso, Texas.

WANTED—Fine design of monuments and statuary to make for retail trade. R. A. CURTIS, 14 Cyclorama Place, Indianapolis, Ind.

WANTED—Four first-class marble copers, three first-class rub-bed hands, and one first-class marble cutter who thoroughly understands plans. Address, EAST TENNESSEE STONE AND MARBLE CO., Knoxville, Tenn.

FOR SALE—Double-drum holsting engine; used only three months; good as new. Also, 600 feet of steel cable and well-rigged boom derrick, with patent head. Just the outfit for contractors and builders. Will sell singly or all together at two-thirds cost. A bargain. Address, WATSON, CRAIG & SUTHERLAND, Warren, O.

WANTED—Three good marble carvers. Address or apply DAVIDSON & SONS, foot North Market-st., Chicago.

THE SCIENTIFIC POLISHING WHEEL must be O. K. when letters like the following are written to GEO. B. ECKHARDT, No. 909 Bancroft St., Toledo, O.:

Mr. Geo. B. Eckhardt: ANGOLA, N. Y.
DEAR SIR:—I received the wheels, and find them as you recommended. We can do more with them in two hours than we could with the old style in ten, and am more than pleased.
Respectfully yours,
C. A. GATES.

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ARTHUR KIRK & SON,

PITTSBURGH, PA.

lisher undertaking to issue a journal devoted to a trade seemingly so circumscribed as that of rock plaster. But this journal is really an excellent thing, and evidences in its contents that it has found a fertile field from which to make a luxurious living. Think of the uses of plaster and its manifold qualities, and it will easily be seen that here is an interest that should have its proper journalistic exponent. We are pleased to note that it has secured it, in such an amplified and excellent form as presented in that publication.

John Wiley & Sons, publishers, New York City, announce as in preparation "A Practical Treatise on Foundations" by W. M. Patton.

Mansfield Merriman, professor of civil engineering in Lehigh University, has written, and John Wiley & Sons, New York, have published "A Text-Book on Retaining Walls and Masonry Dams." Such a book has been needed by civil engineers and others who are called upon to estimate upon any project requiring extensive earth works of any size or necessary stability. The book is divided into five chapters which treat respectively Earthwork-Slopes, Lateral Pressure of Earth, Investigation of Retaining Walls, Design of Retaining Walls, Masonry Dams. Under the heading of each chapter are found convenient subdivisions representing the problems which an engineer is called upon to solve when estimating upon this class of work. The book, so far as can be determined by examining it without working out any of the problems, seems to be just what engineers and others need to assist them in their work. As such it will be welcomed by the profession. There are 122 pages, well printed and well bound, and the whole work is as comprehensive as anything issued in recent years. It should be in the library of every practical civil engineer in the land.

From the press of John Wiley & Sons, New York, has been issued a book of about 700 pages by Austin T. Byrne, C. E., under the title of "A Treatise on Highway Construction." The book is not claimed by the author as original, but is the compilation of the best part of the works of more than 100 authorities, among

which STONE has a prominent place. The plan adopted by the writer was not to inclose each extract in quotation marks, but he gives a list of the authorities and uses such parts of their material as best suits his purpose in the development of his subject. Highway construction is becoming an exact science in these days, and it is time that the old era of pushing a few cartloads of earth into a road and picking out a few loose stone can be called road building. Up to the time of publishing this work there has been very few that were of any use to the practical man in guiding him in the construction of roads. Mr. Byrne has produced a work divided into twenty-three chapters, each chapter having innumerable subheads which give a good synopsis of the matter treated in any particular chapter. To attempt to give any adequate review of the entire work is useless, but his style of treatment may be illustrated by taking the chapter on "Pavements," the first following the historical sketch. The chapter treats on general considerations and states the qualities essential to good pavements. The interests affected in the selection, the selection and the cost of wagon transportation are discussed, in the latter sub-division is inserted a table showing the cost of different methods of transportation per ton mile. The problem involved in the selection of pavements, adaptability and desirability are treated, and a table giving the number of horses required to move a ton on different pavements is given and numerous other important sub-divisions are added, in which tables are found which make the problem comparatively easy of comprehension. All other departments are equally full and complete, each problem and requirement being worked out so that anyone, whether he possess technical knowledge or not, can acquire much valuable information from the book. It is not too much to say, probably, that it should be in the hands of every person who is called upon to work or assist in working a road, highway or pavement in the United States. It would undoubtedly result in greatly improved roads and city streets wherever it was studied.



LAME HORSES are caused largely by the hoof not growing. Little attention is given this subject by owners as a rule but it is an important one and is only a matter of a short time until its necessity will be seen. A hoof that has stood the hard hammering they naturally get for years without the proper attention stops growing and the horse becomes lame. Then is the time that authorities will disagree when called upon to find the trouble that it may be remedied. This can both be cured and avoided by the use of

Campbell's Horse Foot Remedy

as all owners, drivers and business men will testify who have tried it. To new customers it may be of interest to know you can go to your dealer and buy a can with the understanding that

if it does not accomplish all that is claimed for it money will be refunded.

Corns, Quarter Cracks, Sand Cracks, Split Hoofs, Hard, Dry, Brittle, Tender and Contracted Feet Cured by using

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As by applying it the hoof will become tough and elastic and grow fast so that in time the horse shoer will trim off all dead and diseased parts, leaving the foot in a healthy condition.

For **Scratches, Sores & Barbed Wire Cuts** it has no equal, as it disinfects the sore and heals it from the bottom, effecting a permanent cure.

Swinney and Founder cured by applying to the sore and stiffened parts as it loosens up the hide, relaxes the muscles and starts a natural circulation of the blood.

Quarter Gallon Cans, \$1.00
Half Gallon Cans, 1.75
One Gallon Cans, 3.00
Five Gallon Cans, 13.75

For horsemen we have a 48 page book containing 15 illustrations with full system of shoeing, which we mail free on application.

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ADVERTISERS' DEPARTMENT.

IN EXCELLENT SHAPE.

Among the new advertisers in **STONE** is the Detroit Union Stone Company, of Detroit, Mich. Their stone is buff and blue sandstone from the noted "Henrietta" quarry in northern Ohio, and ranks in quality with the best stone from that region. It is quite well known already, though the company's quarry has only recently been opened up with full equipment of machinery and railroad facilities. It is now in excellent shape to fill orders of any size at short notice. We append a recent analysis of this stone: Silica, 93.725; sesquioxide of iron, .66; carbonate of iron, .355; alumina, 3.82; carbonate of lime, 1.135; moisture, .035; loss on ignition, .235; total, 99.965. Specific gravity, 2.404. Absorption of water, 8.73 (per cent. of dry stone weight.) Trace of magnesia and oxide of mangaese. Analysis by A. J. Morse, chemist of the Michigan Peninsular Car Company, Detroit, Mich. This stone, (the buff stone), may be seen in the new entrance, built last year, addition to St. John's Church, Detroit, Mich.

The Joseph Dixon Crucible Company, of Jersey City, has recently issued an exceedingly handsome and complete catalogue of lead pencils. This catalogue is not intended for general distribution but the company will be glad to send a copy to all dealers in stationery. Strictly speaking, Dixon's "American Graphite" pencils are the only ones which can claim to be American products in every particular and they are readily matched against the finest product of any part of the world.

LARGE CARGOES OF GRANITE CHARTERED.

ABERDEEN, Feb. 28, 1893.

Mr. Wm. C. Townsend,
Zanesville, Ohio, and New York City.

Dear Sir:—Yours of the 10th current was duly received. In regard to Red Swede and Imperial Blue Pearl, I will state that the ports of

Norway and Sweden are still closed up. We are having another blizzard here at Aberdeen. The ports of Norway and Sweden will probably be open early in April. We have the following vessels chartered, lying waiting open water to load for us: "Sifa," "Hjalmar," "Alpha," "Christiana," "Yudun," "Wemyss," "Castle" and "Albertine," carrying in all about 1,100 tons, or 14,300 cubic feet of granite; freight alone will be about £600 or \$3,000. This will enable us to furnish promptly all late spring and early summer orders. We have moved into our new yard close to the docks, which enables us to carry an immense stock of rough granite and our new steam crane gives us great advantage in unloading vessels. When these vessels arrive, I will advise you further. You can say to your customers that we are better prepared than ever to furnish the celebrated Red Swede and Imperial Blue Pearl granites, and they will not have to wait so long as heretofore. Will advise you when vessels arrive, which will probably be in April.

Yours truly, L. M. ELWELL,

Manager for Wm. C. Townsend's Aberdeen House.

ELECTRICITY IN STONE PLANTS.

A new departure in the methods of quarrying and manufacturing stone is the adoption of electrical power. The Leeds Manufacturing Company of Chicago, are pioneers in this line. They have made a study of the subject with reference to all kinds of stone hoisting and working machinery as applicable to saws, hoists, derricks, planes, travelers, etc. So far they have applied it to travelers only, for which they have numerous orders booked. This pioneer work on the part of this progressive firm has excited widespread attention. It will be to the advantage of quarrymen and contractors contemplating the introduction of the electric system into their works to correspond with this firm.

D. V. JOHNSON, Pres't.

E. B. THORNTON, Sec'y.

THE BEDFORD STEAM STONE WORKS,

—Quarrymen and Wholesale Dealers in—

Buff and Blue Bedford Limestone,

ROUGH, DIMENSION AND SAWED.

Quarries in Dark Hollow, Ind. Mills and Yard at Bedford, Ind., on L., N. A. & C. and E. & R. Railway s.

The only Stone Mill here having switches from Competing Railroads.

BEDFORD. - - - - INDIANA.

BUFF SANDSTONE.

BLUE SANDSTONE.

Specify the "Celebrated Cream Buff Stone," (grades 1 and 2), from the HENRIETTA QUARRY of the

DETROIT.: UNION.: STONE.: CO.

Sample Cubes soon ready for Architects and Builders.

Offices: 1,004 Hammond Building, Detroit, Mich.

Shipping Station: Kipton, Ohio, (L. S. & M. S. R. R.)



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Celebrated Vermont Building Slate,
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BILLIARDS, MANTEL STOCK. ESTIMATES GIVEN QUICKLY.

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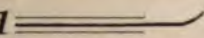
H. L. THORNTON,
Pres't and Gen'l Manager.
E. B. THORNTON, Sec'y.

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Random and Dimension Mill Blocks,
Bases and Monumental Stone.

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

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 Samples for tests delivered free.  Goods delivered f. o. b. Chicago and St. Louis.

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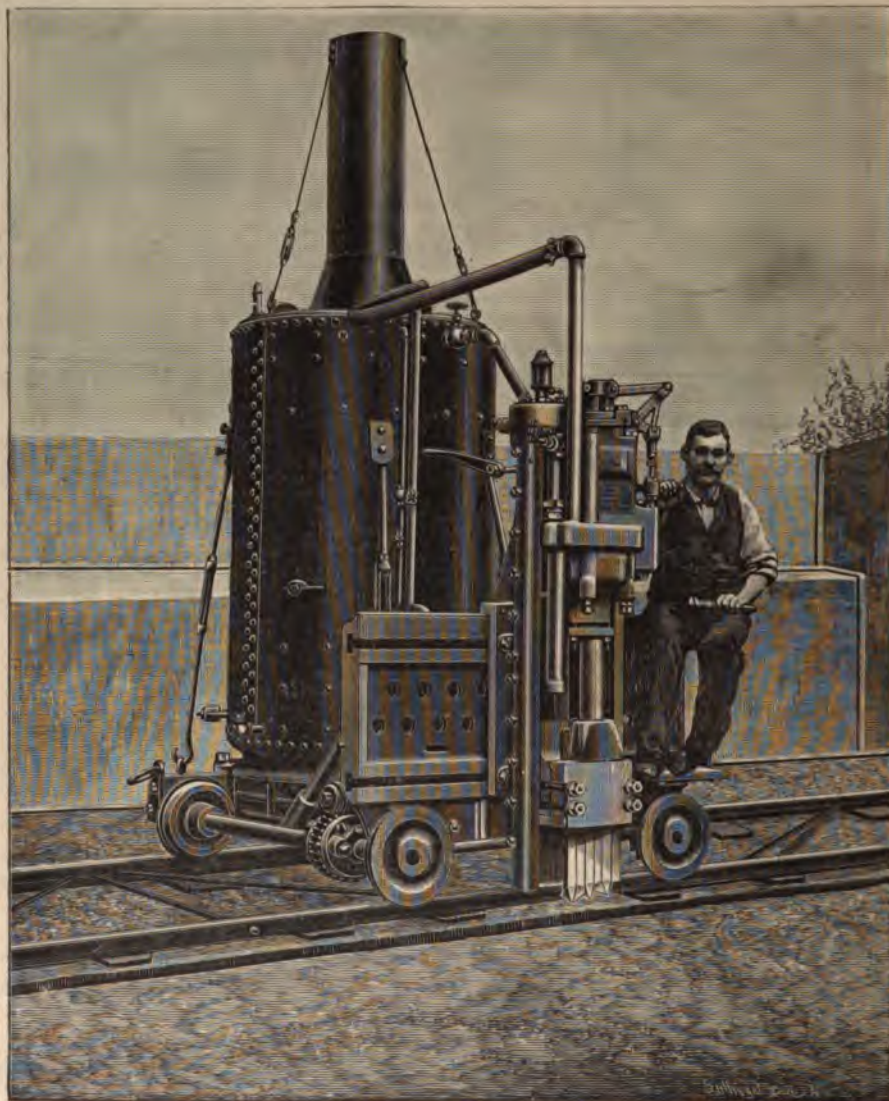
247 and 249 South Pennsylvania St.

Indianapolis, Ind.

NEW INGERSOLL-SERGEANT CHANNELER.

We present herewith illustration of a new channeler being made by the Ingersoll-Sergeant Drill Company, of New York. This company, it will be remembered, was the first

acting principle, and it has been shown conclusively that the principle is not only a success, but that it is admirably suited for certain kinds of stone. Recently the company has been experimenting with an entirely new channeler, and that which is illustrated is distinctly differ-



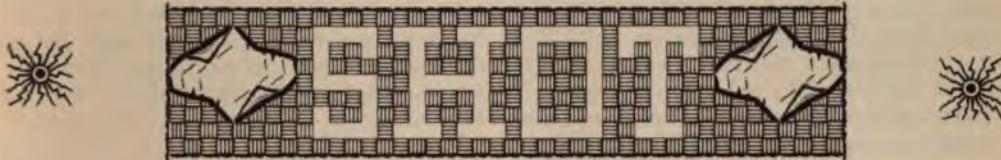
to build direct-acting channeling machines, having introduced them about eight years ago, building what was known as the "Ingersoll" channeler, which was invented and built by Mr. William L. Saunders. Subsequently other channeling machines were built on the direct-

ent from the old machines. The improvements have been made by Mr. Henry C. Sergeant and the present channeler is called the "Ingersoll-Sergeant." The distinct points of difference are that the cylinder is very much larger in diameter, thus preventing sticking. All the

B. C. & R. A. TILGHMAN,

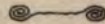
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Patent Chilled-Iron Globules, or



For Fast Sawing and Rubbing of Stone.

ORIGINAL AND STANDARD MATERIAL OF THIS KIND. WARRANTED SUPERIOR TO ALL IMITATIONS AND SUBSTITUTES
COSTS LESS, CUTS FASTER AND WEARS LONGER THAN ANYTHING ELSE. A COMPETITIVE
TRIAL WITH ANYTHING IN CUTTING STONE SOLICITED.



**SPEED, DURABILITY, ECONOMY, SAVING OF SAW BLADES, REDUCTION OF POWER, OVER
TEN YEARS' CONSTANT USE.**

Send for circular. See new prices for 1892.

Bedford Stone Quarries Company

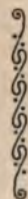
The Largest Dealers in Oolitic Limestone in the United States.

OFFICERS.

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General Manager.



The Company actively operating a number of Buff and Blue Quarries; fully equipped with all modern machinery. Capacity practically unlimited. Mills and Quarries lighted with electricity enabling Company to run both day and night. Any sized order solicited. In addition to the Quarries operated, the Company owns about 1,000 acres of the finest Oolitic Limestone land, and is prepared to lease Quarry Sites to responsible parties.

For prices and further particulars, address

BEDFORD STONE QUARRIES COMPANY

Bedford, Ind.

gears have been done away with, the feeding of the machine on the track being done through a small, three-cylinder, independent engine which is provided with a friction strap by means of which there is no danger of tilting the machine. The feed engine simply fails to feed when not called upon to do so. Many other features have been added, which are based upon the large experience which the Ingersoll-Sergeant Company has had in this line of business. The valve is moved by direct contact with the piston and a large saving in steam consumption is effected by a positive valve and by a short stroke. The stroke is under thorough control, it being possible to strike hard or fast as desired. Recently Mr. William L. Saunders, representing the Ingersoll-Sergeant Drill Company, made contracts on the Chicago Drainage Canal which gives the company the exclusive supply of rock drills on nine of the sections and the exclusive supply of drills and channelers on six sections. This gives them the business in drills and channelers for most of the Drainage Canal work, and in order to accommodate the trade they are erecting suitable houses on the line where they propose to keep machinery and duplicate parts in stock. The interests of the Ingersoll-Sergeant Drill Company on the line are in charge of Mr. Judson Budro, an old and experienced quarryman and employe. The company is represented in Chicago by Parker, Melcher & Ingraham, 100 West Washington street.

A BUSY CONCERN.

A recent letter from Scoville Iron Works, Chicago, reports that firm as running full time, and more orders booked than ever before at this time of the year. It is a noted practice of this large and progressive concern that orders of any size can be expeditiously filled, and they have never been too busy to delay shipments, having ample facilities, and a complete modern plant. Their list of specialties embraces everything in the line of stone-working machinery and supplies.

R. A. CURTIS & COMPANY

of Indianapolis, wholesalers in granite and statuary, report trade so far this year as far beyond their most sanguine expectations. Mr. Curtis, who has charge of the designing department, has had to increase his force

of draughtsmen and is still unable to keep up with his orders. This is convincing proof of the admirable work designed and finished by this firm. Their specialties are rock-faced work in gray brilliant granite, black coral granite, and hand-made designs by a process of their own. H. A. Rockwood, who is familiarly known to dealers throughout this section, has become manager of the monumental department of the firm and is very largely responsible for its gratifying growth and still increasing business.

THE BUCYRUS STEAM SHOVEL AND DREDGE COMPANY.

The new works of the Bucyrus Steam Shovel and Dredge Company at South Milwaukee, Wis., are about ready for occupancy, and expect to start up in about a week. This plant will be the finest of its kind in the country, and for its size, will be the best found anywhere.

Owing to the large business done by the company, the works at Bucyrus have been decidedly cramped for some time. The change to be made will give ample accommodation. The new location is in every way a most advantageous one for the conduction of a business such as that in which the Bucyrus Steam Shovel and Dredge Company is engaged, and there will be plenty of room to increase the capacity of the works when this again becomes desirable.

Regarding business done during the past year, the company write: "We have never been so full of work as at present time; we have over \$200,000 worth of unfilled orders on our books, and more coming in constantly. Our bid to the government for a large suction dredge, for use on the Mississippi, Red and Atchafalaya rivers, under Capt. John Millis stationed at New Orleans, has just been accepted by the war department, and we are commencing to build. The contract price was \$69,500 and the dredge will be very complete. Our design was original and our bid was accepted on its merits, though it so happened that we were the lowest bidders."

Recently completed orders of the Bucyrus Steam Shovel and Dredge Company comprise a large combination dredge for the Plant Investment Company at Fort Tampa, Fla., which will cost about \$80,000, and a large number of other dredges of various types, besides their regular steam shovel work which is always large.

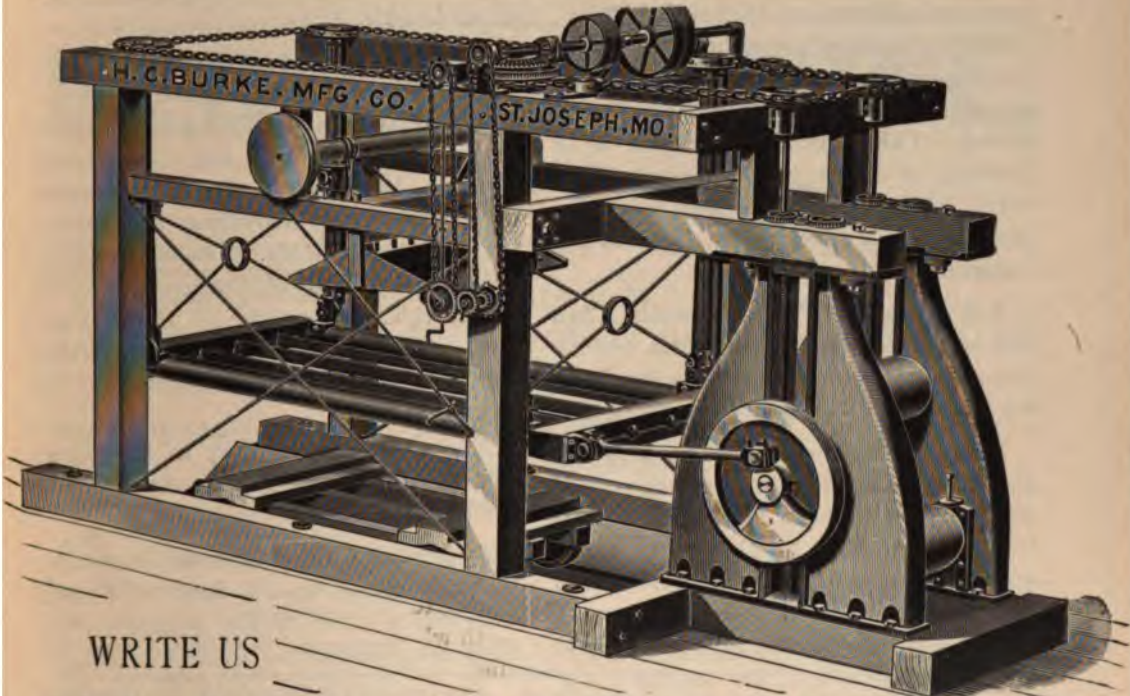
THE POTSDAM RED SANDSTONE CO.,

POTSDAM, N. Y.

The stone produced by this company is unequaled in beauty, strength and durability. Commended by the highest expert authority. Used in many of the finest buildings in the United States and Canada.

Prompt Shipments Guaranteed. Estimates for Stone cut from Drawings and delivered free on board of cars, ready to lay in the Building.

Specialty.—RANDOM ROCK-FACED ASHLAR FACINGS, ready cut, including ROCK-FACED JAMBS AND CORNERS, shipped from stock in any quantity. Apply for samples (free and prepaid to Architects only), pamphlet and prices, as above.



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Headquarters for SAW BLADES.

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Pittsburgh Iron and Steel Works, Pittsburgh, Pa.

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Established 1867

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Parties visiting the quarries will
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MONUMENTAL NOTES.

The state association of United Confederate Veterans will be invited to hold its annual meeting at Vicksburg, Miss., probably in May, and to participate in the ceremonies incidental to unveiling the confederate monument now completed. This was agreed upon at a meeting of Camp 32, Confederate Veterans, when the committees were appointed to make the preparations for entertaining the association.

The Scranton, Pa., Caledonian Club has asked permission from the county commissioners to erect a statue to Robert Burns on Court-house square

A strong effort will be made, says the *Baltimore Sun*, by representatives of the Maryland Society of the Cincinnati to induce the next legislature to make an appropriation for the erection of a monument to Gen. William Smallwood, one of Maryland's early governors, and the first president of the society. Mr. John S. Gittings was appointed a committee of one to take charge of the matter. The last legislature made such an appropriation, but the bill providing for the erection of the monument was vetoed by Governor Brown. Gen. Smallwood's body lies neglected and unmarked, and his grave is overgrown with weeds in a field on the banks of the Potomac in Charles county, Md.

The finance committee of Boston, Mass., have been requested to include in its loan bill \$25,000 for a monument to Gen. Warren.

It has been suggested that a monument to the late General Butler be erected at Lowell, Mass.

The committee appointed by the Lee Camp some time ago to make arrangements for the erection of a monument to the memory of the late Gen. John R. Cook, has accepted the model made by Mr. Frederick Moynihan, the sculptor, of Richmond, Va. The statue is to be of heroic size and of bronze. General Cook, who was a native of North Carolina, settled in Richmond after the war, and was the first commander of Lee Camp.

A movement is on foot in Copenhagen, Lewis county, N. Y., to build a soldiers' monument.

Efforts are being made at Dansville, N. Y., to complete the fund of \$3,000 with which to erect the proposed soldiers' monument.

The resolution to provide for the erection of a statue of the late United States Senator John E. Kenna in the National Gallery in the capitol at Washington passed the house with an amendment, and was then passed by the senate with the amendment agreed to. Instead of the \$10,000 appropriation asked for in the bill originally, the amount was reduced to \$5,000 with the understanding that the friends of the senator are to contribute the other \$5,000 which will be required to make a suitable statue. The commission to secure the statue includes the governor, the presiding of-

"Acme Avondale Stone."

ACME LIME CO., Limited,
Avondale,
Chester Co. Penna.

VOLLMER & REGISTER, Gen. Ag'ts,
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Wholesale Manufacturers and Dealers in all Kinds of

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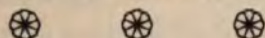
TURNED COLUMNS, CAPS, BASES, BALUSTERS, FINALS FOR BUILDINGS.

Posts, Vases, Founts, Everything in the Turning Line Neatly Executed. Cut-Stone Fronts, Cemetery Vaults,
All Kinds of Stone Trimmings, etc.

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Mills and Workshops at the Junction of the L., N. A.
& C. Ry., the B. & B. R. R., and the E. & R.
R. R. Shipping facilities unsurpassed.



Regarding Quality of Stone and Workmanship, we
refer to the Mutual Life Insurance Building
and Times Building in New York, also Cotton
Exchange Building in New Orleans, La.

Quarries in Dark Hollow.

Stone Fronts, Cemetery Vaults, Large Platforms,

all kinds of Trimmings and Planed Moldings

Send Plans for Estimates.

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Railways; also shippers via Ohio river.

General Office, Portsmouth, Ohio.

Shipping facilities unsurpassed.

Write for sample.

[Established 1865.]

ficers of the two houses of the legislature, Senators Camden, and Faulkner, J. E. Dana, of this city, and R. O. Campbell, of Wheeling.

A monument to the pioneers of Sherburne, N. Y., is to be erected on the grounds of the Congregational church, at that place.

There is a movement on foot to erect a monument at Owensboro, Ky., in honor of the Confederate dead of that city. The *Enquirer*, referring to the subject says: "When asked to-day what was being done in the movement to erect a monument in the court-house yard to the memory of the Confederate dead, Dr. Todd, one of the most loyal ex-Confederates of them all, said: 'But little just now. However, we intend to bring Gen. Basil W. Duke here to deliver a lecture, the proceeds to go to the monument fund, just as soon as the political sea quiets down a little. We hope to have no trouble in raising all the money necessary to insure the erection of the monument.

Preliminary steps are being pushed forward by the Patriotic Order Sons of America, for the erection of a Washington monument at Sacramento, Pa.

A large and handsome lot in Pine Grove Cemetery, Lynn, Mass., situated near the soldiers' lot, and behind a beautiful rockery, has been purchased by the Winnepurkit tribe of red men of Glenmere. The lot will be ready by June, and steps will be taken to have a suitable monument erected there. Other orders in Lynn contemplate purchasing lots in the cemetery.

A bill has been introduced in the New York legislature appropriating \$1,000 for a monument to the Mexican soldiers buried in Greenwood cemetery, Brooklyn.

Senator Barnes' bill to erect a \$5,000 monument over the unmarked grave of ex-Governor Jennings at Charlestown, Ind., has passed both houses.

The Welshmen of New York City are now organizing a movement to erect a grand monument to Thomas Jefferson.

A decision is soon to be made on a design for a soldiers' monument to be erected on Central Square at New Britain, Conn. The monument is to cost \$20,000.

The committee appointed at the recent encampment of the Grand Army Department of Delaware, to issue a fund to erect a monument in memory of General Thomas A. Smyth, met at the office of Edgar A. Finley, No. 800 Market street, Wilmington, Del.

An appropriation of \$350 has been made by the Board of Freeholders at Perth Amboy, N. Y., for the erection of headstones for deceased sailors and soldiers.

An entertainment has been given at Marshall, Texas, for the purpose of raising funds to erect a monument to the memory of the late General Walter P. Lane.

Supt. Zechman's, Reading, Pa., project to procure funds for a monument to Conrad Weiser by collections in the different schools in the county, is meeting with general favor.

The United States senate has passed the bill appropriating \$50,000 for the erection of an equestrian statue to General John Stark, of Manchester, New Hampshire.

The committee on appropriation at Hartford, Conn., have reported favorably on a resolution appropriating \$5,000 to the Groton Monument Association.

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AND FIND IT PAYS.

OTHERS would use it, but are afraid it will damage the Rock. It won't, if you know how. Hundreds have learned that it is the Safest, Speediest, Most Economical Way to Quarry



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J. W. WILLARD, Gen'l Manager.

Indianapolis Office, 81 West Washington Street.

J. R. Payne has withdrawn his interest in the Vermont Granite Co., of Lima, O., and the business of the company will be continued under same name by Messrs. W. W. Butler and E. V. Wells.

The Thalia Club at Warren, R. I., is making preparation for an entertainment for the benefit of the Massasoit monument fund.

A bronze statue of Burns is to be erected in Denver, Colo., for which W. Grant Stevenson, of Edinburgh, has sent over designs both for a standing and seated figure.

The Sibley County Soldiers' Monument Association has been formed at New Rome, Minn., for the purpose of raising funds for a monument in that county.

Locations for Industries.

The trend of manufacturing is Westward, and among all manufacturers there is a latent feeling that the West as a territory for the manufacture of goods presents features unexcelled by any other section of the Union.

The eight States traversed by the 6150 miles of the **Chicago, Milwaukee & St. Paul Railway's** tracks (Illinois, Wisconsin, Northern Michigan, Iowa, Missouri, Minnesota, South Dakota, and North Dakota), possess in addition to the advantages of raw material that which is a prime factor in the industrial success of a territory—a people who form one live and thriving community of business men in whose midst it is safe and profitable to settle. Many towns on the line are prepared to treat very favorably with manufacturers who would locate in their vicinity.

In addition to its vast agricultural resources, its territory comprises forests of hard and soft woods, mines of iron and other metals, coal and other minerals, quarries, clays of all kinds, tan-bark, flax and other raw materials. Water-powers, (both river and artesian) are also available.

QUARRY interests on the line are being rapidly developed and there are a number of places where SEWER PIPE works would command a great market for their product.

A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines.

The central positions of the states traversed by the Chicago, Milwaukee & St. Paul Railway makes it possible to command all the markets of the United States. Nothing should be permitted to delay enterprising manufacturers from investigating. The Industrial Department promptly furnishes practical information to manufacturers. As it is to the interest of the road to secure the location of industries at places where the surroundings will insure their permanent success the information furnished a particular industry is pertinent and reliable.

LUIS JACKSON.

Industrial Commissioner, C. M. & St. P. R'y.,
160 Adams St., CHICAGO, ILL.

THE N. C. HINSDALE'S SONS GRANITE CO.,

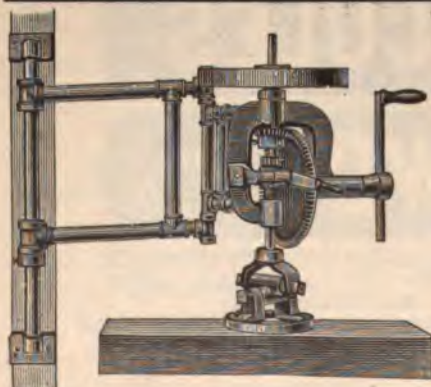
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AIR COMPRESSORS,

STONE CHANNELERS
HOISTING ENGINES.

COMPLETE PLANTS OF

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BUCYRUS STEAM SHOVEL AND DREDGE CO.,

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MAKERS OF

Steam Shovels,

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Stripping Coal and Ore, Railroads, Con-
tract Work, Brick-Yards, High-
ways, Etc., Etc.

—ALSO—

STEAM DREDGES.

In Your Correspondence with Advertisers
ALWAYS MENTION "STONE."

NOTES FROM THE QUARRIES.

A blast fired in a quarry at Graniteville, Mo., recently dislodged 160,000 cubic feet of stone, all in one mass.

The storage house at Huttenstine's quarry, Kutztown, Pa., was set on fire by an overheated stove. Dynamite and explosive caps were stored in the building, and when the flames reached them an explosion took place that wrecked the whole building.

Mr. J. B. Milliard, of Lebanon, Pa., who owns the Tulpehocken stone quarries, east of Myerstown, is making preparations to drill a hole through the rocks from the top of the bank at the Tulpehocken stone quarries to the level, a depth of sixty feet, and then load it with dynamite. This is expected to loosen thousands of tons of stone.

Superior brownstone may be quarried all winter. It defies all tests, whether of fire, frost or cold.

Numerous stone quarries and ledges near Providence, R. I., which have been idle during the last ten months, will soon be opened and a large number of drillers, stone cutters and ledge men will be set at work preparing for construction work at the various mills through the valley as soon as possible.

An explosion occurred at Osterman's stone quarry on the Baltimore pike near the Protestant cemetery in Fairmount, Ohio. About 9 o'clock one of the gang of unknown was sent after a three-pound can of powder. He carried it to a tree near which the men had built a fire to keep warm. Hardly had he

started away than a spark flew into the can and ignited the powder. The explosion created some excitement, and at first it was thought that several men had been injured. After the excitement was over it was found that the only one injured was Patrick Paverman. He was slightly burned about the legs, and was removed to his home.

Maybe, Mich., is making preparations for a big building boom this spring on account of the establishment of an extensive stone quarry business near there.

Messrs. Thos. Ritch & Son are busy at Greenwich, Conn., getting out a large contract for Byram blue stone. Recently a very heavy blast was made in the upper quarry that took five kegs of powder, weighing 250 pounds. This broke out a quantity of stones that Mr. Ritch says were the largest in size and the finest in quality that he ever saw. The greater part of this lot is for the city of New York, and will be used in Central Park for coping, etc.

The new stone quarry recently opened near Slovan, Wis., about five miles from Kewaunee, by Mark English, of Green Bay, promises to be an industry of no little importance. The stone will be loaded on dump cars at the quarry and run down the railroad track to the docks at Kewaunee. The new docks will be situated on the edge of the bayou immediately north of the ferry slip, and are to be constructed by the railroad company.

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No. 10
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Manufacturer,
Exporter, Importer and Wholesale Dealer in

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At the stone quarries of Jacob Miller, east of Myerstown, Pa., the other day, Samuel Shott performed an act of heroism. A shanty in which 100 pounds of dynamite was stored was on fire when Shott rushed into the burning shed and carried it out of danger. The men present applauded the heroic act.

Tobias Pauknecht, as administrator of the estate of Joseph Winter, has sued J. W. and M. H. Gale of Cleveland, O., for \$10,000 damages. Winter was killed by the fall of a derrick in the East Cleveland quarries while at work for the Messrs. Gale. He left six younger brothers.

The Blue Diamond Slate Company of Slatington, Pa., commenced to open a new quarry near the old abandoned one. The machinery was removed to the new quarry. There is an immense body of slate where the new quarry will be opened, and if the slate splits rightly it will be the most productive quarry in the Slatington region.

A New York capitalist has made extensive purchases of lithographic stone deposits in Marmora, Hastings county, Ont.

Walter L. Chillson, superintendent of the brownstone works at Hummelstown, Pa., was killed by being struck by a steam shovel.

In connection with the quarry business heavy yokes of cattle are used for dragging stones to the railroad tracks. The Chapman Granite Works of West-erly, R. I., owns a yoke of oxen, which it is did, weigh 4,500 pounds.

A building stone quarried near Norwich, in England, in 1889, weighed 35 tons, the largest on record.

It is rumored that Frederick De Peyster, who has been the agent and manager of the Shaler & Hall Quarry Com-

pany at Portland, Conn., for the past year, is to resign and accept the position of superintendent of the Air Line.

Following a blast in the West Bedford, Ind., quarry, a dark substance was found oozing freely from a crack in the stone. Further examination showed it to be black as pitch, of the consistency of thick molasses, almost odorless and burning freely when ignited. Several persons pronounced it bitumen. The find will be further investigated.

Kocher Brothers are arranging for the opening of their large quarry at Franklin, N. J., which has been shut down for several months owing to the death of the senior partner.

Casper, William F., and Conrad J. Stalle have incorporated the Casper Stalle Quarry and Construction Company at East St. Louis. Capital \$25,000.

There has been some talk in the newspapers lately about the discovery of a wonderful soapstone quarry worked in former times by the Indians. This was in Rhode Island, and was described as if unique. Nevertheless there are at least twenty-five such aboriginal quarries of soapstone in the neighborhood of Washington. The biggest of them all—in fact the most extensive one known—is in the District of Columbia, close by Connecticut avenue extended. Such quarries are found all through Virginia and Maryland. These soapstone quarries furnished the cooking utensils employed by the Indians in times gone by. Everybody knows that this stone resists the action of fire, and that is the reason why it is much employed at present for mantles, grates and facings for fire-places. Many old-fashioned fire-places in Virginia are made of soapstone slabs. There are many people to-day who consider that a

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buckwheat cake is not a really truly buckwheat cake unless it is cooked on a soapstone griddle. Griddles of that material, however, are not in favor with most cooks, because it takes a long while to heat them.

The Ledbetter quarries a Hampstead, Tex., which suspended operations recently are again loading rock for the Galveston jetties. It is understood that the gravel pits in the same place will also be in active operation very soon furnishing gravel for the Houston street paving contractors.

The curious traveling stones of Australia are, it seems paralleled in Nevada. The lithic rovers found in the last named state are described as being perfectly round, about as large as a walnut, and of an ivory nature. When distributed on a smooth surface within two or three feet of each other they immediately, with total disregard of the homely proverb which inculcates the acquirement of moss, commence rolling toward a common center, where they lie in a bunch like eggs in a nest. It is perhaps superfluous to say that the "stones" are largely composed of magnetic iron ore.

One of the most interesting exhibitions in connection with the recent Oriental Congress in London is a collection of tools used by workmen in building the pyramids of Egypt. They were gathered and are exhibited by the illustrious Egyptologist, Flinders Petrie. These utensils indicate that ancient workmen had an astonishing acquaintance with many tools which we have been accustomed to consider essentially modern. Among the exhibits are solid and tubular corundum-tipped drills, and straight and circular saws and chisels described as "not a bit inferior to those now used."

One of the most remarkable geological substances found in any part of the world is a stone believed to be peculiar to Finland, where it occurs in many localities, its peculiar property being a natural barometer, curiously foretelling, by the change of color, the probable character of the weather in the near future. It is known by the name of the *semakuir*, and is said to turn black shortly before an approaching rain, while in fine weather it is mottled with spots of white. For a long time this interesting phenomenon was a mystery, but an analysis of the stone shows it to be a fossil mixed with clay and containing a portion of rock salt and nitre. This fact being known the explanation of the changes was easy; that is, the salt, absorbing the moisture, turned black when the conditions were favorable for rain, while the dryness of the atmosphere would as naturally bring out the salt from the interior of the stone in white spots on the surface.

The farmers in the vicinity of Hope, Kan., have discovered a vast body of stucco, underlying a great tract of land in that neighborhood. A train load has been sent to Chicago for use on the world's fair buildings. The people of Hope are sinking shafts on all sides and a grinding plant is to be erected to carry on the new industry.

In the rock drilling contest at El Paso, Cal., two teams participated, the drilling being done in sandstone. The home team went down into the rock thirty-two and five eighths inches in fifteen minutes, one man doing the striking, the Hadley team cut thirty-five and one-half inches before the time was up, they taking a turn about in striking.

One Monroe county, Indiana, stone quarry pays the Monon Railway Company \$20,000 a year in freight charges.

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Hydenville, Vermont.

G. A. Kunz, a diamond expert, says of the late discovery in Idaho: "The geology of the country around the diamond fields is precisely the same as in South Africa, and not unlike those of Brazil. The only difference is that these are not so much broken. In my opinion these diamond fields will be larger than either those of Africa or Brazil, the blue cuts or shafts being a great deal larger and more clearly defined."

Daniel R. Beatty, of Conshohocken, Pa., has been appointed superintendent of the quarries of the North Carolina Brownstone Company at Sanford, N. C.

But few persons are aware of the quantity of stone which is being shipped east from the Bedford, Ind., quarries. There are now contracted to go to points in New York and New Jersey, and some to New England, 2,500 car-loads of Bedford stone, to be used largely in public buildings and a few fine houses.

The National Association of Marble Cutters held their meeting at St. Louis. The main object of the convention was to decide upon a course of action that will abolish the use of penitentiary prepared marble, and they seemed confident of adopting such measures at this session as will drive prison-wrought labor from the market.

The largest pyramid in Egypt is 146 yards high—that is, about ninety times the average height of man; whereas the nests of the termite are 1,000 times the height of the insects that construct them.

The granite cutters in Vermont are greatly interested in the attack on the Vermont prohibitory law, made in the Addison county court, for if the law is declared unconstitutional it will also affect the famous granite cutters' conspiracy case which is to be reheard at the next

term of the Washington county court, that case coming under the same section of the United States constitution as that under which the prohibitory law is attacked.

A largely attended meeting of marble polishers was held recently in Boston. The committee appointed some time ago to present a petition to congress looking to an increased duty on finished and polished marble reported that the matter would come up for consideration some time next month. The petition asks for an increase from 50 cents to \$1.25 ad valorem, as to guarantee protection from the product of Holland, Belgium and other foreign countries where labor is cheaper. The assembly favors the admission of rough block marble free of duty. The petition has already been indorsed by the Knights of Labor, alliance state and district assemblies.

The Pacific Stone Company which was recently incorporated by Frank Wood of Albany, Frank Buelar and W. W. Marquam, is intended to develop the Wood's stone quarry at Albany, Ore. The new company has a capital stock of \$250,000, and besides stone quarrying also contemplates the establishing of a plant to manufacture vitrified brick and fire-proofing from the valuable bed of clay over-laying the quarry. This Albany stone is not a new article on the market, having been used for many years locally at Albany. The stone presents many strikingly handsome architectural features in both rough and dressed construction, a quality that is rarely found to a high degree in any rock formation.

G. F. Bodwell, of Chicago, has formed a stock company with a capital of \$100,000, and will open and operate his granite quarry in Hallowell, Me., this spring.

CADEN'S BUENA VISTA QUARRIES,
ESTABLISHED 1890.



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Marble Work in the Country.

MARIETTA, - - - GEORGIA.

Articles of association have been filed for the West Muncie Bluestone Company with a stock of \$25,000. The company will operate in West Muncie, Ind., and will dig, cut and sell bluestone and lime. Stock will be sold in shares of \$50 each and business will be conducted by the following officers: C. W. Hoover, president; Samuel Parkinson, vice-president; George W. Love, secretary. David H. Higgins will superintend the operations of the company. The officers above with the names of Thomas Reynolds and John W. Love, constitute the Board of Directors.

C. D. Peters & Co., among the largest slate dealers in Pennsylvania report that the outlook for the slate business this season is better than for years. There is hardly any stock on hand. If the weather should moderate the supply for spring trade will be equal to the demand. Should the elements prevent work much longer, it will take extraordinary work in the spring to fill orders.

The Heagan Mountain granite property at Prospect Me., formerly operated by the Sargent Granite Company, but which has for some time been under attachment, has been purchased by W. P. Baird, of New York.

The Mount Airy, N. C., Granite Company recently received an order for \$60,000 worth of granite with a prospect of the order being doubled.

A. T. Fuller, of Augusta, Me., has sold one-half interest in his quarry at "Oliver's Ledge," so-called, to Hallowell parties who will at once proceed to develop the same, having already a \$40,000 contract to fill and a prospect of another \$100,000 one.

Another company has been formed at Vinalhaven, Me., to carry on the gran-

ite business. The new company is named the Leadbetter's Island Co-operative Paving Company. The members of this company are practical paving cutters. The privilege which is an excellent one, has been leased for a term of years. The paving manufactured by the company will go to James Grant of New York, the large contracts he has to fill requiring all the output of these Union Co-operative companies.

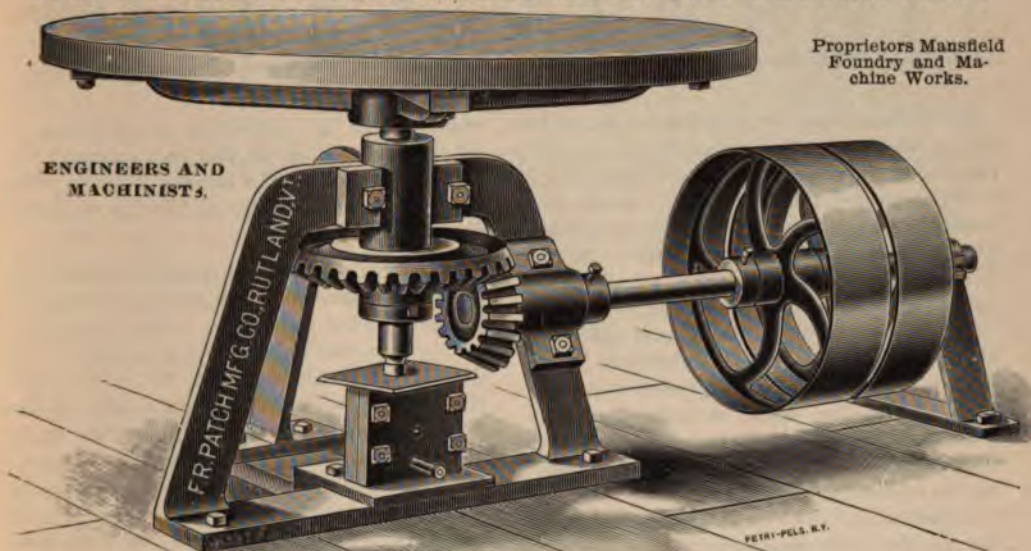
Mr. W. L. Watson, a St. Louis contractor is making preparations for the opening of the Hop Hollow stone quarries near Alton, Ill. Mr. Watson will build a switch to the quarries and get the stone out in large quantities.

A company has been organized under a charter recently granted, to be known as the Yadkin Valley Brownstone Company. The following are the officers: John C. Tee, president; Allen Makin, vice-president; C. S. Sherwood, secretary; John C. Tee, C. S. Sherwood, Allen Makin, Henry Makin, W. W. Brittingham, directors. The principal office of the company will be in Portsmouth, Va. The quarry is situated on the Cape Fear and Yadkin Valley railroad, and is fully equipped for work.

The Middlesex, Conn., Steam Brownstone Company, the entire stock of which is owned by George J. Grossman, H. Wales Lines and John W. Coe of Meriden, and W. F. Banney of Cromwell, has begun operations. Ten men under the charge of William R. Saviter of Meriden, are at present employed by the company. The machinery for sawing stone will be in place in about three weeks. The capital is \$6,000, divided into 240 shares of \$25 each.

The granite industry of Hallowell, Me., and vicinity promises to be excellent the coming year.

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WORLD'S FAIR NOTES.

Sir Richard Webster presided on November 16 at a meeting of the Society of Arts, in London and in the course of a long speech alluded to the part Great Britain and her colonies were to take in the forthcoming exhibition at Chicago. The space occupied, he stated, will amount to upwards of 450,000 square feet, of which upwards of 250,000 square feet will be occupied by Great Britain. This is the largest space ever filled at any International Exhibition by any foreign country; and it is interesting to compare it with the space occupied by Great Britain and the colonies in previous exhibitions—in Vienna, 170,000 square feet; Philadelphia, 195,000 square feet; and in Paris, in 1889, 233,000 square feet. The commission are satisfied that in the great majority the industries of Great Britain and her colonies will be fully represented. The great majority of our leading companies—the Cunard, White Star, Union Steamship, Donald Currie, and other lines will exhibit models of ships. Amongst the British colonies, Canada will be the largest exhibitor, as might naturally be expected.—*European Mail*.

The patent office will exhibit as complete a collection as possible of models of all important American patented inventions, with a view of showing the great advance in the several arts, which is due in no small degree to the encouragement and protection afforded by the patent system. Many of the desired models are now in the possession of the patent office, owing to loss by fire and the fact that in recent years models have not generally been required. The available appropriation is not sufficient to enable the office to make the missing models, and therefore the commissioner of patents has issued an invitation to inventors and manufacturers to loan such models to the office, with the understanding that they will be returned and that due credit will be given in labels and catalogues. This invitation is being met with hearty response.

A miniature model of a typical western farm, complete in every detail, will be exhibited in the Washington state building. Among other

exhibits will be a collection of specimens of all the species of birds, fish and animals to be found in the state. The interior of the building will be decorated in large part by the women of the state.

Canada will make a remarkable display of her mineral resources. The province of Ontario has determined on making a large exhibit of all the minerals found in that province, and Quebec has resolved not to be behind her. Nova Scotia, so rich in mineral wealth, is also actively engaged in bringing together specimens of her richest deposits. It is expected that the gold ores of Nova Scotia will surprise many of the visitors, while the samples from her coal fields will afford some idea of the wonderful resources of the province in that particular. The asbestos, mica, plumbago and phosphate deposits will form prominent features in the Quebec exhibit; while the rich nickel ores, for which Ontario is now so famous, will receive much attention from that province. The Dominion geological survey will make a very fine exhibit, which will afford facilities for studying the mineral resources of the country, on either the limited provincial basis or from the wider dominion standpoint.

The Vermont building is a staff covered, one-story structure, 62x70 feet on the ground and thirty feet high. The style is Pompeian and the effect picturesque and attractive. It comprises an open court twenty-four feet square at the front, flanked by offices and reception rooms opening from it on either side, and a large semi-circular audience room at the rear. The monumental shafts on the facade support allegorical figures of agriculture and quarrying. The broad entrance through the front portico leads into the atrium or court, in the center of which is a handsome marble fountain furnished by the Vermont Marble Company of Proctor. On the sides of this interior court are covered piazzas from which the reception and committee rooms and postoffice open. The gable of the main hall faces the end of the court in the center of which is a porch supported by four caryatides and above it a large semi-circular window sur-

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mounted by allegorical bas-relief. The main hall is circular and columned and lighted from above. Considerable color is used in carrying out the Pompeian idea in architecture, on both exterior and interior. All details are purely classical and combined in a most effective manner. The building will cost about \$15,000.

The final assignment of space is a matter that is being eagerly watched by nearly 100,000 prospective exhibitors, each of whom is anxious to learn not only his space and its location, but also the amount and location given to his rival. The department chiefs will require about two months, and in some cases more, to separate the meritorious from the worthless exhibits offered. All of them are crowded for room, and in addition to the difficulty of selecting the most desirable display they will have to scale down the space requested by exhibitors.

An interesting exhibit is to go from the Black Hills, S. D., which will display in novel form the minerals found in the hills. The exhibit when arranged will be in the form of a two-story and a half cottage. The framework of the structure is already built, and is in the style of the Renaissance, with towers and numerous gables. It is impossible to decide on all details, of course, until all the material has been collected, but the following plan will be carried into effect as near as possible: The foundation will be made of pure white limestone, headed with a layer of Buffalo Gap "calico" stone. The first story will be veneered with pink quartz. Above that the handsomest rocks obtainable will be used—copper, mica, schist, needle, spar, garnet, etc. The lower part of the tower will be made of rubies and the upper part with some sparkling substance. The windows and shingles are to be of mica and the steps of marble. The cottage will, no doubt, prove an attractive feature of the state exhibit.

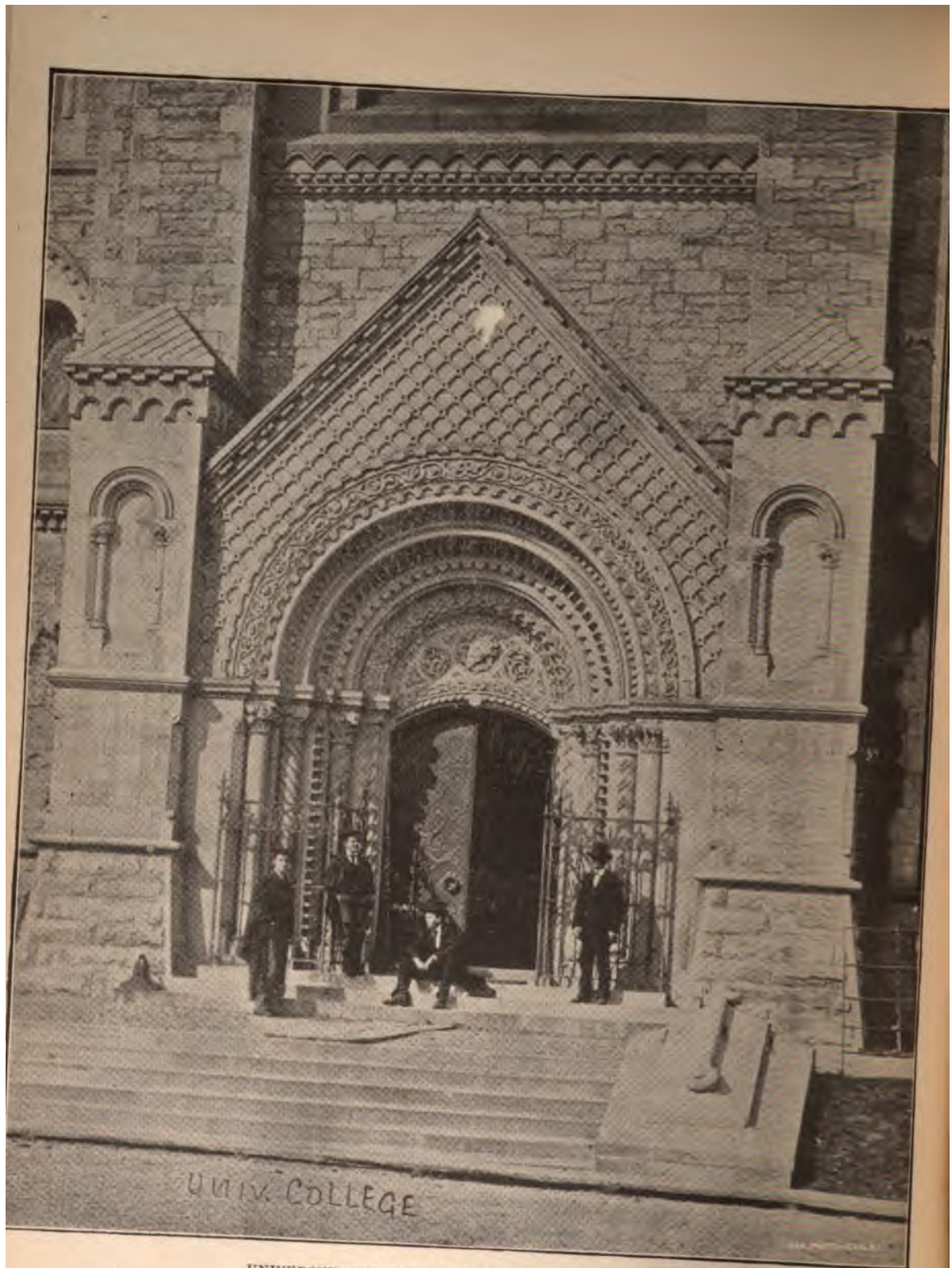
Germany's building will cost about \$125,000, and will be a combination of typical styles of German architecture, such as are seen in perfection in Nuremberg. It will be massive in construction, the first story being of great blocks of sandstone, and the second of a combination of brick and cement. At one end will be erected a Gothic cathedral, the windows of which will show artistic effects, being the work of several of the most famous designers in

Germany. The interior of the building will be finished throughout with natural woods unpainted. Much of the building material has already been received from Germany, and the construction of the edifice is in progress.

Plans for the Texas building is a composite style of architecture, with predominating touches of the Moorish type. The plans were drawn by J. R. Gordon, of San Antonio, and were enthusiastically received by the people of Texas before being sent to Chicago. The contract for the construction of the building was awarded to Harler & Sons, of Chicago. When completed, it is predicted, the Texas building will not suffer by comparison with the larger structures, and will doubtless afford an inviting retreat to many a weary pilgrim from far-off lands to spend a restful hour upon its spacious porticos and verandas.

Krupp is preparing to send a gun alongside of which those in our new cruisers are mere pocket pistols. It will require a special steamship to bring it across the ocean and a special carriage to convey it from the seaboard to Chicago, besides a special track to take it in to the grounds, where a heavy foundation will be required to mount it. Lieutenant Baker, speaking of the gun, says: "Our biggest guns are about forty-five feet in length. The Krupp gun, will be, I think, about eighty-seven feet long. If it were fired on the lake front the concussion would be so great that it would shatter nearly all the window glasses in Chicago. It would carry a ball from the lake front up over the housetops of Evanston, a distance of fifteen or eighteen miles. Its initial velocity is 4,500 feet per second."

An interesting exhibit will be a model of the Paris exhibition of 1889. The reduction at present occupies a large room near the Palais de l'Industrie, Paris, where it is now being exhibited. M. Pasquier, who conceived the idea of thus enabling Americans who were unable to visit the Paris exhibition to see what the exhibition was like, has spent over 300,000 francs on the reproduction. The electric lighting of the model is an important feature, about 350 tiny incandescent lamps being employed. Some of these lamps, used to represent the street lighting, are only one-half of a candle power. The current is supplied from a dynamo and a battery of accumulators.



UNIV. COLLEGE

UNIVERSITY COLLEGE, TORONTO, CANADA.



STONE

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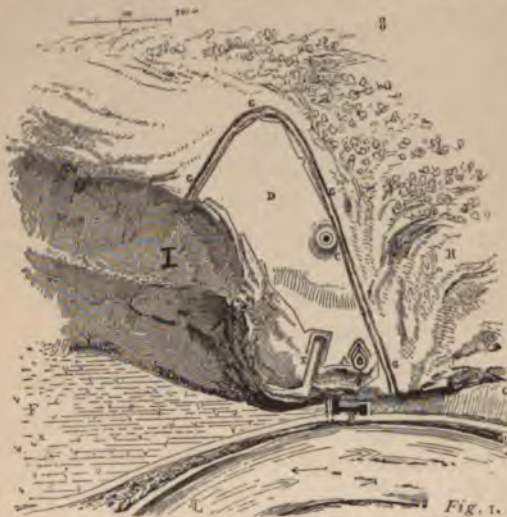
THE CHATEAUX OF FRANCE—III.

THE chateau of Roche-Guyon is a transition between the early chateau and the one which we recognize as belonging to the true feudal period. It is only in the early part of the thirteenth century that we find the veritable feudal chateau, which was a group of buildings so constructed as to be capable of united defense, while at the same time each structure was complete in itself. These groups of buildings were surrounded by the chateau walls and the moat, and in ordinary times formed a united group. But if one were taken, or if the enemy entered the walls, the others still possessed their complete means of defense, their stores of provisions, their exits by which the garrison could make sorties and take the offensive, or escape to the country when they could no longer maintain themselves. This difficult programme was most skillfully carried out by Richard the Lion-hearted, at Chateau Galliard. The early chateau was, as we have seen in the examples given, simply a donjon surrounded by walls and a moat—the remaining structures not being calculated for defense. When the walls were entered by the enemy the garrison took refuge in the donjon. In the chateau of the true feudal period the garrison could inclose itself in any of the numerous structures which were within the walls, all of which were provided with separate and complete means of defense. The chateau of Roche-Guyon was built in the period of transition between the two.

Roche-Guyon is situated on the Seine, about ten miles from Mantes, on a rocky promontory which, by an abrupt turn in the river, is cut into the form of a peninsula. This is the typical situation of the Norman chateau;

one where it could render passage up or down the river impossible. The opening or mouth of the peninsula was not more than a mile and a quarter in width. Thus a small force could protect this entrance.

Figure 1 gives the general situation of the chateau at the extremity of this rocky promontory. B was the main building erected nearly on a level with the river and completely intercepting travel on this bank of the Seine. Figure 2, shows the levels of this chateau, A being the river, and B the main building. The outline of the escapement between B and C was given artificially by cutting the rocks. A in figure 1, and C in figure 2, is the donjon which will be described later. Between the main building and the donjon was a subterranean passage cut in the live rock. This is shown at H in figure 2. At C, figure 1, and E, figure 2, was an artificial mound upon which was erected a sort of advanced work which was high enough to command and overlook the entire valley. In figure 1, a very deep and wide dry moat was dug in the rock at E, on this side the escarpment not being as steep as elsewhere. At F and H the slope was so abrupt as to render impossible all idea of attack. A second and shallower moat was dug at G. There were no masonry walls inside this moat, earthworks and palisades being all that was necessary for protection. The profile shows how



difficult it was for an assailant to maintain himself in the lower chateau unless he was in possession of the donjon; after having taken the chateau he would infallibly have been crushed by the garrison above. The donjon could only be taken by blockade. But how was it possible to blockade a donjon which was connected with the river by a subterranean passage?

While the general arrangement of Roche-Guyon is interesting, our attention is centered in the donjon which was as unique as that of Arques, and hardly less complicated. It was most certainly built to carry out the following programme as outlined by Viollet-le-Duc:

"Of all military constructions, donjons certainly explain most clearly the mode of life, the habits and the manners of the feudal chiefs of the Middle Ages. The feudal seigneur still preserved some reminders of the Frankish chief. He lived in his dwellings in the midst of his companions in arms,

But, beginning with the seventh century, we find that he attempted to isolate himself and his family from the garrison. We feel everywhere, inside and out, the effort at defense. At night the keys of the donjon and even those



Fig. 2.

of the chateau, were taken to the baron and placed under his pillow. As we have seen, and shall see, the donjon is always placed near the outside walls. It even had its secret exits independent of those of the chateau through which to escape and make sorties into the country. The lower stories were without windows and used for storage purposes; the intermediate floors were the habitations and the chapel; the summit was used for defense. A well, fire-places and even bake ovens were always found. The donjons were always varied in arrangements, and this variety indicates the attention given by the barons to this important part of their chateaux. It is evident that each baron wished to mislead his assailants by his novel defensive arrangements."

Figures 3 and 4 show the general plan of the donjon of Roche-Guyon. A is the lower chateau, which was connected with the passage leading to the donjon by a drawbridge at B. This bridge is shown in figure 4. C is a plat form cut in the rock from which one entered a subterranean passage. This passage ended at a second platform which was open to the sky. A third platform, also uncovered, was located at F. Between the two was an opening E, which was ordinarily spanned by a wooden bridge. In case of attack this bridge was destroyed or removed. A second and long subterranean passage cut in the solid rock bed from F to G, which was located within the second wall of the donjon. K is a section of this passage. It was absolutely impossible to force this entrance.

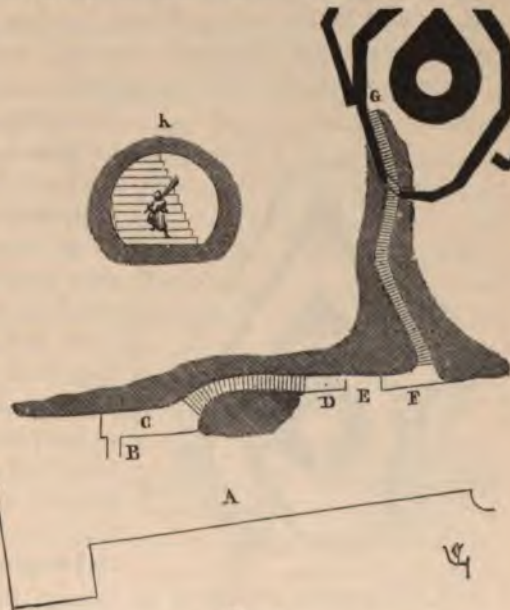


Fig. 3.

B—Stone.

Figure 5 is a plan of the first story of this donjon. A is the opening to the subterranean passage. In order to reach the interior of the donjon proper, one ascended the staircase B, and entered the postern C. At the left is seen a circular staircase H, leading to the upper floors. It was built in the thick masonry walls. P is a well and L, a small silo in which the provisions were preserved by the use of salt. It is said that the masonry inside this silo is still deeply impregnated with salt. Entrance to the second inclosure was through the two doors G and C. At H, was an exit through which the garrison could escape in case of need. It was completely defended by the two

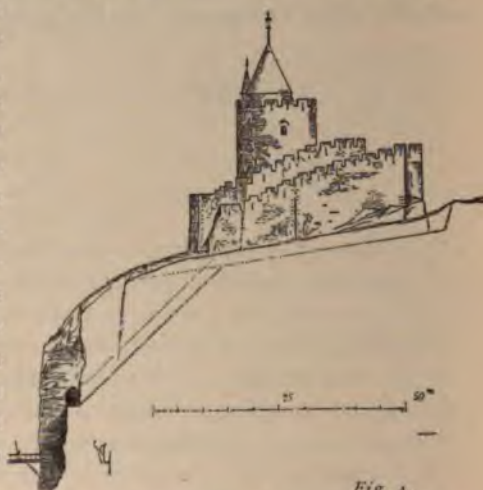


Fig. 4.

The slope of the ground was such that all attack must be massed on the point I, figures 5 and 6, which was a solid tower with a platform back of it, on which the besieged were massed and from which they fought. It was exceedingly difficult to scale the walls M and N, and almost impossible to mine them. If the assailant succeeded in entering the first wall, he



Fig. 5.

found himself facing the interior wall which, as shown at R, figure 6, was both high and well provided with defenses. If he succeeded in entering the interior inclosure he must then force the donjon proper. In fact, the only practical means of reaching the interior point L, figure 5, was by digging a subterranean passage from I to L, which was a long and immensely difficult operation.

Fortresses, such as those described, served as long as the principal danger lay either in treachery or surprise. As soon as the barons became skilled in the art of war, as soon as they were powerful enough to place large and reasonably well disciplined armies in the

field, it became necessary to change the means of defense. It was the method of attack which decided the means of defense. The experience gained in the first crusades completely changed the method of war in the northern countries. The undisciplined, disorderly armies which went

into Syria, returned experienced soldiers, well versed in the art of war. They encountered the or derly methods of the Turkish armies, and in the disastrous campaigns in the Holy Land gained an experience which greatly changed the military architecture of northern Europe.

The principal fault of a fortress such as the donjon of Roche-Guyon, was the great complication of the defensive means, the multiplicity of detail and the indirectness of the passages; all of which greatly hindered the prompt and vigorous action of the garrison upon the point attacked. When Richard the Lion-hearted built Chateau Galliard, he overcame this difficulty,

as we shall try to show. He brought with him the experience gained in the crusades, and knew that his enemy

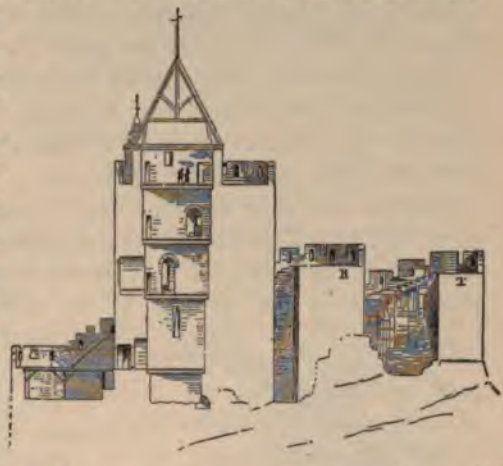


Fig. 6.



Fig. 7.

Philip Augustus had been trained in the same school. Thus he was forced to change his method of construction in order to maintain himself against attacks by the organized army of the French king. After the treaty of Issoudun, Richard recognized the mistake he had committed in ceding Vexin and Gisors to Philip Augustus. He saw that all Normandy and particularly Rouen were thus open to the French king whose ambition could only be satisfied by taking that country. To repair this mistake, Richard built Chateau Galliard, which for many years frustrated all attempts of the French armies. It was located on the Seine, a few miles from Roche-Guyon on the frontier of Normandy. As long as this chateau remained in the hands of the English, Philip Augustus found it impossible to advance on Rouen.

Richard chose the site of this chateau with the foresight which belongs only to great captains. We quote again from Viollet-le-Duc: "His plans once

formed, he executed them with a tenacity and will which broke down all obstacles opposed to his enterprise. Within a year not alone was the fortress built, but a complete system of defensive works was erected upon the border of the Seine at the point on the river where Rouen can be defended against an army coming from Paris. We still find here the qualities which distinguished the Norman fortifications, but they were put in practice by a man of genius. It was here a question, not of the defense of a domain, but of an entire province. The military point was chosen in such a manner as to defend a capital against an enemy and as well to surprise and attack them, and all this under the limiting conditions of a most unfavorable frontier. This chateau, notwithstanding its ruined condition, still preserves the imprint of the military genius of the English king.

Although a poor politician, Richard was a consummate warrior and repaired the faults of the politician by his courage and perseverance."

From Bonniers to Gaillon the Seine moves nearly in a straight line to the northwest. Here it turns sharply to the northeast and at Andely the river turns on itself and form a very narrow peninsula. At a time when nearly the entire communication of the country was by the river, if Richard could so place a fortress as to make it impossible for an army to pass, he could protect his territory. It was on this peninsula near Andely that he built Chateau Galliard, the key to Normandy. Figure 7 shows the location of the fortress. At the extremity of the



peninsula A, on the right side of the river, the Seine follows the escarpments of chalky rock which are very high and overlook the whole of the alluvial plain. B is an island in the middle of the river upon which Richard erected an octagon-shaped fort, which was supplied with towers, moats and palisades. This fort was united to the two banks by wooden bridges. On the right bank at C he built a small town which was surrounded by a wall. This was known as Petit-Andely. An artificial lake or pond, D, surrounded and isolated this town. Andely proper, E, which even before the chateau was built was a good-sized town, was fortified and surrounded with moats. The principal fortress was built on a rocky escarpment overlooking both the river and the two Andelys. At the base of the escarpment three rows of piles were driven into the head of the Seine forming a barricade as shown at F, figure 7, and Y, figure 8. At H, was built an additional fort on the side of France.

Having finished the outlying fortifications, Richard devoted himself to the principal fortress, a plan of which is given at figure 8. The chateau was built upon a height, the escarpments of which were very steep excepting at A, which was a neck of land joining the site of the chateau to the main plateau. This point alone was attackable. Here Richard concentrated his attention. He first dug a deep dry moat in the rock and built a strong and high tower whose parapets reached the level of the surrounding

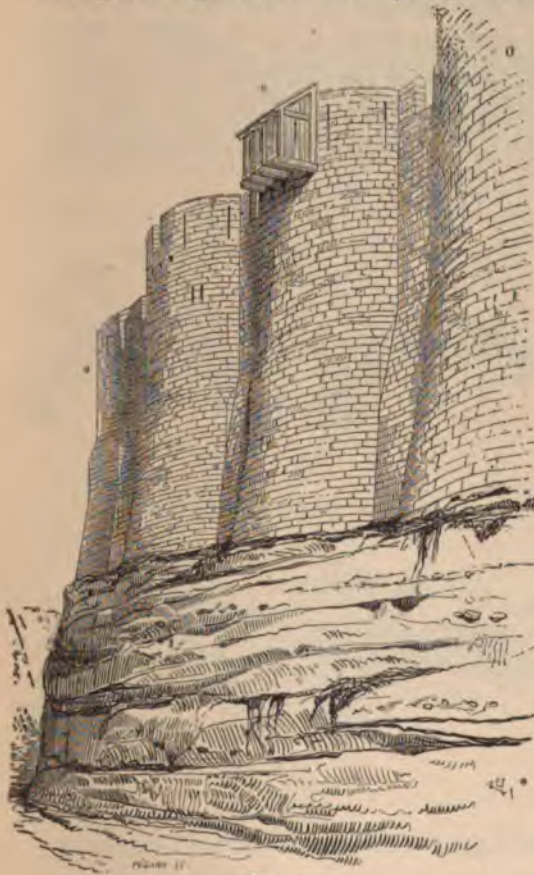


Fig. 9.

country. In this way he commanded the heights. This tower was flanked by two smaller ones B B. The sides at D, followed the natural slope of the rock, so that the tower A dominated the whole of this advanced work A D D. A second moat, also dug in the rock, separated this part of the chateau from the main buildings. It will be noticed that there was no exit from the advanced work A D D directly to the outside, the only exit being by way of the lower court, E. This court contained the servants' quarters, the chapel at H, and the stables. At G, were located immense caves or cellars for the storage of provisions. They were supported by pillars and lighted from the moat I L, which it will be seen, surrounded the chateau proper. The entrance K to the chateau was located about seven feet above the counterscarp of the moat L, and was protected by a stone structure

located in the moat. This entrance was protected by herse, folding doors, machicoules and all those precautionary defenses which formed so important a part of the defense of chateaux. These will be described in another article. O, was the donjon located in front of the entrance K and enfiling it. The apartments of the commander were at N. At P, was a postern gate, which was masked and defended by the defense O. This postern did not open directly to the outside but to the *chemin de ronde* R, from which exit to

the outside was had by means of a second postern. T T were towers and flanking walls. V, was a tower built on a point of the rock and united to a massive wall X, which descended the escarpment, crossed the large moat and joined the barricade of piles at Y, which intercepted travel on the river. This wall X, made it impossible to enter the moat or climb the escarpment at this point.

Figure 9 is an exterior view of the flankings of the outside wall. It is of interest because Richard was the first to use pronounced flankings. Previous to this time, reliance was rather placed in the thickness and strength of the walls than in their adaptability to defense. He was also first to supplement houlds with machicoules. This change will be illustrated next month.

At the top of the walls and flanking towers shown in figure 9 was the *chemin de ronde*, a path on which the guards and soldiers could mass themselves and fight. The walls were simply a continuation of segments of a circle about ten feet in radius, and separated by a wall only three feet long. The walls rested on the solid rock; no loop-holes were cut in the lower part, the entire defense being placed at the summit. Figure 10 is an outline of the wall and shows the great skill and care exercised by Richard in its construction, as well as his intimate knowledge of the weapons then in

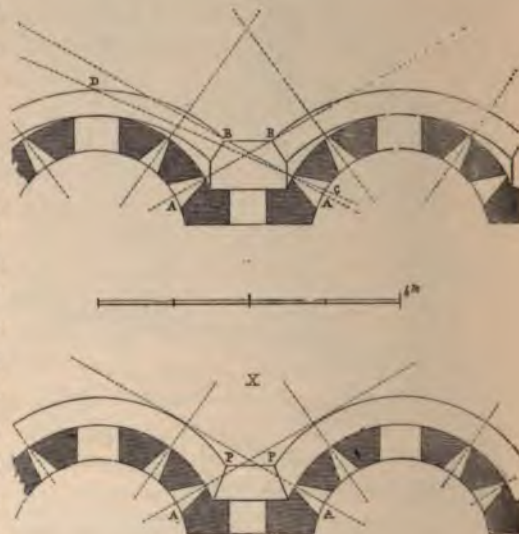


Fig. 10.

use. "The portion of cylinder composing this wall do not descend vertically to the escarpment of the fosse, but penetrate the portions of the cones as they approach the base in such a manner that the inclosure between these cones and the intermediate walls can hide a miner. It was really a line drawn through the axis of the lateral loop holes A which located the points B at the base of the cones as well as the slope of the lower part of the wall. Thus through the loop holes A, because of the arrangement of the curved surface, a miner standing on the point D could be seen as indicated by the

line C D. If the exterior of the cylinder had descended vertically, or if the segments had been portions of cones, and without changing the curves as indicated in X, figure 10, the triangles P would have been sheltered from arrows shot through the axis of the lateral loop-holes A. All this very skillful arrangement of cylinders and cones, Richard covered by the points at the base of the walls, a very important matter at the time when attack and defense of strong places only became serious at short range."

Next month we shall describe the donjon of Chateau Galliard which differed in some important details from those built previous to this time, and show how this seemingly impregnable fortress was taken. We shall also give an exterior view of the entire chateau.

Louis H. Gibson.



THE PLYMOUTH MARBLES.

PRIOR to my going to England I promised you I would endeavor to get you an article on the limestone marbles of Plymouth, England.

To do so and get a correct account I visited the works of J. and E. Goad, of Plymouth, Eng., who kindly deputed their genial foreman, Mr. Cottier, to show me over their works. Messrs. Goad Bros. have practically a monopoly of these beautiful marbles, having full control of the quarries. They have the most modern appliances for handling goods; they were then getting out columns for a New York house.

I may say that many men in this district and in Canada learned the first use of their tools in that celebrated old business house, notably the late R. Hanger, of Fairhaven and Hydeville, Vt., one of the pioneers of the marbleized slate industry of this country, and the originator of the Fairhaven Marbleized Slate Mantel Co.

The Plymouth marbles are raised from a great band of Devonian limestone, about half a mile in width, which extends from the Devonport dockyard, some 6 1-2 miles easterly, to a place called Sherford. Associated with this run of rock is an isolated patch of considerable extent at Yealmp-ton, and two or three smaller patches of no commercial importance. The rock is crystalline, hard, and durable; massive, as a rule, in its more central portions, and largely fossiliferous.

For centuries this limestone has been used in the neighborhood of Plymouth for building purposes; and there are extant structures dating from the 15th century, which give it an excellent character as a weather stone—notably, the tower of St. Andrew's Church, at Plymouth. In the 17th century it was used in such large undertakings as the Plymouth Citadel; and, in fact, in all the public buildings of the town. With the slightest possible surface oxidation, it has everywhere maintained its face and texture intact.

The hardness of the material seems, however, to have militated against its use as ashlar until comparatively recent years, and its chief employment in ordinary building works has been in rubble masonry, which in the case of dwelling houses is commonly stuccoed. That it repays, however, and admirably, the labor and cost of perfecting, a number of modern structures show, notably the Plymouth Guildhall and Municipal Buildings, the whole of the exterior masonry of which, dressings excluded, is of this stone.

The most important constructional work in which Plymouth limestone has been used is, however, the well-known Plymouth breakwater. For this purpose new quarries were opened in the limestone at Oreston seventy years since, and wrought to such an extent for this one undertaking, that over 4,000,000 tons were raised, and deposited in the sea to form the gigantic mole.

The whole run of Plymouth limestone may be regarded as marble in the sense that it will take a good polish; but in practice this term is restricted to the varieties best suited for ornamental purposes, and the larger blocks—the rest being used either for building or for burning into lime. Nor is it more than a century ago that attention was first directed to the value of the Plymouth limestone for ornamental uses. The one fact that throughout the mediaeval churches of Devon, Purbeck marble is almost universally employed for enrichments, is sufficient to attest that the value and beauty of this local stone was overlooked. Just a century ago, however, a traveled visitor to Plymouth, who probably had his attention called to the stone by its use in the footways of the streets (where, after a shower of rain, being well polished by traffic, it has a strikingly handsome appearance), declared that he thought "the Plymouth marbles were more beautiful than any foreign marbles." Not many years after, Polwhele followed suit; and Sir Henry de la Beche, in his "Report on Devon, Cornwall, and West Somerset," speaks of some of the local marbles as "extremely handsome," and notes—"Marbles of very great varieties of color may be obtained, though tints of gray chiefly prevail" (hence the wide scope for judicious selection), "and they deserve to be far more extensively employed than they have hitherto been; a greater demand would cause many more varieties to be worked."

The chief points at which the Plymouth limestones are now worked—some of the older quarries having been abandoned—are Cattledown, Pomphlett, Radford, Oreston, and Billacombe, the proprietors being Messrs. Goad & Co. They are not worked specially for marble, but principally for lime and building stone, at the minimum of cost, and on the largest scale. It is no unusual thing to bring down thousands of tons at one blast. To procure the marbles, the results of each blast are carefully examined, and the suitable blocks, ranging from five tons to 200 tons duly set aside. There is practically no limit to the size of these blocks, except the possibility of moving them; and the economical process adopted secures that there shall be always on hand a large stock of material of every needed scantle, and of the widest variety of color and figure.

The most forcible proof that has been given of the value of this stone, in the combination of the constructional with the ornamental, is supplied by the Brompton Oratory, already cited, where plinths and columns,

pilasters and capitals, panels and courses, of selected Plymouth marbles in rich variety form the chief structural features of the interior. So far as strength is concerned, it is estimated that a load of seventy tons per foot super. is well within the limits of safety; but the stone has never been known to fail the roughest tests applied to it in the formation of heavy works like seawalls and docks.

The variety presented by the Plymouth marbles is remarkable. The "figure" of the coralline examples is often exceedingly beautiful, sometimes bizarre, especially when the favositidae occur—colloqually called "feathers." Other fossiliferous kinds, again, are picturesquely marked by the sections of included shells, and color varied.

The range of color is, however, most remarkable. The prevailing hue is gray of differing shades, but short of positive blue there is almost every other tint that can be named. The richest black, self or varied with white, occurs at Billacombe and Pomphlett. At Billacombe, too, there is raised a curiously brecciated variety, largely composed of creamy, semi-transparent calc spar, relieved by included fragments of reddish-brown rock. Radford supplies, among other kinds a rich rose red of singular purity. A quarry at Kitley, has yielded the most beautiful green marble in the kingdom, clouded and banded in varying shades between lustrous oil-green and a deep olive. Then there are a tender dove color, ranging to a delicate lilac; a black with pink veins of very effective character; gray and dove spangled and veined with rose or ruddy brown; a warm chocolate, and a glowing yellow, mixed with black, of great rarity and equal beauty. In small pieces, all the colors enumerated may be obtained free from admixture, and in great purity. In the larger they are commonly associated as we have indicated, and sometimes the more massive blocks really present a chromatic range of half a dozen different tints and hues.

Some idea of the capabilities of the marble for structural decoration may be conveyed by the fact that single blocks used in the columns of the Brompton Oratory are upwards of ten feet in height by over two feet in diameter, weighing some five tons. But this is only the realized limit of application. Blocks can be had up to any movable and usable dimensions; while so far as quantity goes, the quarries could be worked for another half century without appreciable falling off.

G. B. Benford.

TRANS-ATLANTIC NOTES.

THE new bridge near the Tower of London is rapidly approaching completion. This great work has been in hand for the past seven years, and it is calculated that another twelve months must elapse before it can be opened for traffic. The problem was to build a bridge, over the Thames, of such a nature as not to obstruct the waterways. This has been solved by the erection of a double bridge; one at the level of the roadways, on each side of the river; and one at a level sufficiently high to allow the tallest masted ship to pass underneath it. The upper level will be reached by stairs, built in two massive towers, and will be used when the lower level bridge is open for the passage of river traffic. The low level bridge consists of two huge bascules with a span of two hundred feet. To see their enormous platforms lifting and falling, will be one of the sights of London. They will be worked by the hydraulic power press and built of Cornish granite and Portland stone.

The British Museum has been enriched by a remarkable gray granite shrine from the island of Philæ, south of the first cataract in upper Egypt. It was presented to the authorities by the Egyptian Government. It is between ten and eleven feet in height, and weighs about seven tons. It is a valuable relic, as there is nothing like it at present in the Museum. The color of the stone would seem to indicate that it was specially brought from a distance, as it is well known that the local granite, and indeed all the rock in the Assouan district is red. It is remarkable, too, that the hieroglyphics are in relief, and not sunk as usual. The shrine is believed to be of some date between 300 and 230 B. C., but on this and some other interesting points, we shall expect information when Doctor Budge, the keeper of the department, has deciphered the inscriptions.

To come from the granite workers of 2,000 years ago to those of the present day; from Egypt to Scotland. I note that the Rubislaw Granite Company has presented a very favorable report. The directors state that last year's business has been the best since the formation of the company. The size and quality of the stone has continued to improve, and on getting to lower levels, the directors found their prospects so encouraging that they decided to sink at one part of the quarry to a further depth of 70 feet. The net profits of the year amounted to £3,480.17.6. After paying 7 per cent on preference shares and 6 per cent. on debentures, writing off depreciation, and providing the dividend on ordinary shares, there remained a balance of £295.18.6 to be carried forward.

The value of quarry property is well illustrated by the experience of a

friend of mine, who sends me some interesting information with respect to a Welsh slate quarry, of which he is the owner. He has sunk two pits, the dimensions of which roughly average as follows: No. 1, 60 ft. x 32 ft. x 72 ft. deep. No. 2, 54 ft. x 38 ft. x 58 ft. deep. The amount of rock removed from the pits has been: No. 1, 4,741 cubic yards; No. 2, 4,161 cubic yards. Out of these totals there has been wasted in cutting: No. 1, 800 cubic yards; No. 2, 580 cubic yards.

The two pits have therefore produced in rock, good and bad, 7,530 cubic yards. This has been worked up into slabs and slates, which have sold at the quarry for £9,523 sterling. I do not know how this record will compare with those of American slate quarry owners, but it speaks volumes for the value of quarry property. Here is a piece of land of a superficial area of under one-tenth of an acre, which produced rock worth nearly £10,000.

An important experiment with ammonite has just been carried out at a marl quarry near Dudley. This new explosive is claimed to be the safest and most powerful blasting agent known to modern science. It consists of pure ammonium-nitrate and nitrate-naphthaline, both of which are not explosive by themselves; but in combination make a highly explosive compound. The result of the combination is a yellowish powder which is contained in a water-proof metallic case, and is exploded by means of a detonator. In the experiment in question three holes, each 17 inches deep, three inches in diameter, and 25 feet apart, were bored in parallel lines, about 12 feet from the face of a ledge of solid marl. Into the holes, 60 pounds of ammonite were inserted and lightly tamped. When the charges were exploded a mass of marl weighing considerably over 1,000 tons, was gently lifted up, and shattered into blocks from end to end, in a most convenient manner for future working.

A circular saw for cutting stone has been doing good work at Stockport. The saw blade is constructed of steel, $\frac{3}{8}$ inch in thickness, with diamond teeth filed into it; this is mounted on a steel screwed shaft driven at a speed of about 800 revolutions per minute. A block of hard grit building stone, three feet in thickness, has been sawed through at a speed of six inches per minute. No abrasive material is required, such as sand, steel shot, or diamond grit. The same surfaces are not strained or shaken loose, and the saw will "notch," "bevel," or "cut," at any angle. The driving power used is 14 actual horse-power. The block of stone to be sawed is loaded on to a truck running on rails. The truck is provided with a revolving table, which may be turned in either direction, at any angle to the saw. The edge of the saw is prevented from vibrating unduly, and deviating from the vertical by suitable slides. A cover is placed over the blade, which collects the water carried up by the saw, whence it drops upon the block and maintains an abundant supply of water to the cut.

Arthur Lee.

THE STORY OF A PAVING BLOCK.*

GRANITE when of a proper texture, is generally considered the most desirable formation for paving blocks, for the reason that the stones make a more excellent and enduring pavement than sandstone or trap rock. All granite, however, does not possess good paving qualities, and a capital distinction should be made between a formation that is too soft, too brittle and unsound, and that which is tough, light colored and sound. It is the story of the latter that we are to tell, such a block as will sustain a crushing weight of about 18,200 lbs. to the cubic inch, and will have a life of fifteen or twenty years under heavy traffic in the streets of our large commercial cities.

When we reflect that the two cities, New York and Brooklyn, alone consume on an average from 15,000,000 to 20,000,000 of blocks per year to keep their streets in proper condition, we are impressed with the importance of this industry for the entire country, and our curiosity being excited, we are at once possessed with a desire to know the history of the little blocks that form such an important factor in road making. In order to gratify this desire we recently made a trip to Cape Ann on the coast of Massachusetts, one of the most interesting granite regions in this country, where we obtained the material for our story.

Granite is a crystalline granular rock consisting, in its typical varieties, of feldspar, mica and quartz, and is so named from the Latin *granum*, a grain, in allusion to its granular texture. A large number of other minerals occur in granite, and upon the presence of these supplementary minerals, the numerous varieties of granite are founded. The most common accessory constituent of granite is hornblende, a mineral which appears to replace to some extent the mica, and thus produces a hornblendic or syenitic granite, so named from Syene in upper Egypt where the extensive quarries of this type of rock were worked by the ancient Egyptians, and from which the obelisks were quarried. Many students, however, restrict the term syenite to a granite from which the quartz has disappeared while the mica has been superseded by hornblende. The hornblendic varieties are remarkably tough, rendering them the most suitable as a road material.

Granitite is a name applied to a variety of granite made up of orthoclase and quartz with more or less plagioclase and a small proportion of mica. This formation is also durable as a road material.

* Reprint by permission from *The Street Railway Journal* of October, 1892.

The granite of Cape Ann is designated in the government geological reports as a granitite, while some local petrographers claim that there are large areas of typical syenite, and that the name should be hornblende bio-



Fig. 1. View of Granite Quarry from the Brink.

tite granite. This question we will leave for the petrographers to settle, as well as that regarding the origin of granite, whether it be regarded as the original bed rock of the earth's crust, forming the floor of all subsequent deposits, and the nucleus of mountain chains, or whether it is a metamor-

phic rather than a truly igneous rock and the child of almost any geological age. It is sufficient for our purpose that it is old enough to be tough.

Cape Ann though nominally a promontory is practically an island. It is about ten miles wide and is formed by the projection to the northeast of a ridge of granitic rocks extending from near Dedham, Mass., until cut off by the sea, and extends about twelve miles from the general line of the shore. The internal area of Cape Ann is pretty deeply and evenly covered by glacial drift, but on the shore line, especially near the extremity of the promontory, the surface has been planed down by the erosive power of glacial ice and by the action of the sea in a post-glacial period, both when it was at its present level and when the shore was higher, so that large areas of granite are exposed and in favorable position for quarrying. The quarries that interested us most were in the vicinity of Rockport, Lanesville and Pigeon Cove, villages located at the extreme point of the cape, and which are reached by rail from Boston. Near the first the Rockport Granite Co., of which Mr. F. E. Foster, is superintendent and Mr. Chas. E. Rogers, treasurer and general manager, work extensive quarries and mine the rock, not only for paving but also for monument and building purposes. At the other places Mr. Charles Guidet owns a number of quarries which are worked under the supervision of Mr. L. A. Martin, and the entire output is employed for paving purposes, Mr. Guidet himself being a paving contractor in New York.

Figs. 1 and 2 show the general and economic equipment of typical quarries, from which it will be seen that a number of steam derricks are employed for lifting the blocks and placing them on tram cars or wagons for transportation. The derricks are operated by steam power, a portable hoisting engine being located at suitable positions for this purpose, from which the power is transmitted by either manila or wire ropes which are attached to the block to be moved by suitable clamps or hooks. The entire area of the quarry illustrated in Fig. 1 is about two acres, and in places the excavation has reached a depth of fifty feet. The rock in all the quarries is cut into irregular shapes by joint planes, which in most cases run in horizontal lines, but sometimes in a perpendicular direction (Fig. 3). The attitude of the joint planes to each other regulates the quarrying of the rock in large or small masses as the case may be.

Besides being cut up into irregular masses by the joint planes, the quarried rocks of Cape Ann exhibit in an interesting manner the phenomenon of "rifting." By the term "rift" is indicated an incipient fracture in the rock which has not developed in the form of a joint plane, but along which the rock readily splits, although no relation seems to exist between these incipient fractures and the joint planes. It is owing to these features that the rocks of this region are so serviceable to the quarrymen. For

convenience the quarrymen divide the rift lines into the "rift" and the "cut-off;" the most manifest of these is whatever direction they term rift, and the economical quarrying of the rock with reference to the rifts and joints measures the skill of the quarry foreman.

Having studied the character and some of the peculiar traits of the rock of this region we are now ready to follow the details of quarry work, and for this purpose we will go down into the pit (Fig. 4) among the workmen. The first work consists in starting from their original bed as large masses as possible by blasting, and for this purpose steam drills are employed, with which a nest of three or four holes within a few inches of each other are drilled to the depth of from ten to eighteen feet, depending upon the depth of the seam. Each hole is then charged with twenty-five pounds of blasting powder, and exploded by an electric spark. Frequently it

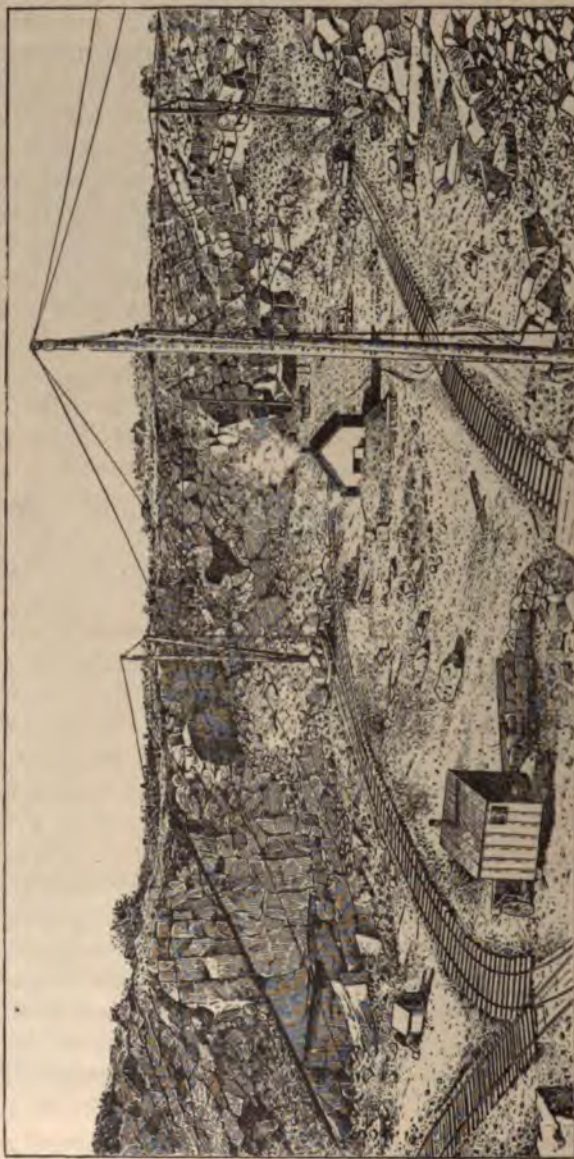


Fig. 2. South Pit of Rockport Granite Co.'s Quarry, Showing General Structure of Rock and Economic Equipment of the Pit.

three or four charges to accomplish the work, as the holes are not usually tamped, a better break, it is claimed, being obtained by repeated charges

requires rather than by tamping, when it would require only one charge. The charge is usually so placed that one end of the mass to be displaced is free, as the rock seems to be held in its bed under enormous pressure, and a satisfactory fracture cannot be had if the entire mass is bound. So great is this normal pressure that a block on being released seems to expand, as it cannot be replaced in its bed, being much too large for the hole from whence it came. The blast having done its work, the detached portions are now cut up by hand into blocks of a suitable size for handling. The foreman first lays off the dimensions and indicates the rifts with a chalk



Fig. 3. Joint Planes, Showing Change in Character in Deepest Parts.

line when a number of men with hand drills proceed to cut a line of five-eighths of an inch holes (Fig. 4) to a depth of three inches and four to five inches apart. A row of holes being completed across the mass, a wedge is inserted in each one, or rather "plugs and feathers," as the quarrymen say, which consist of a tapering steel plug and two steel cheeks. These being in place, one of the men with a hammer of medium weight gives each wedge in succession a firm blow, and then a second, and usually by this time he has gone half way across the block; with the third blow the block has opened with a nearly straight fracture. Masses of almost any size are thus

c—Stone.

detached and in an incredibly short time. The dimensions to which the blocks are cut in the quarry depend upon the size of the paving blocks which are to be made from them. Usually these are three feet wide and

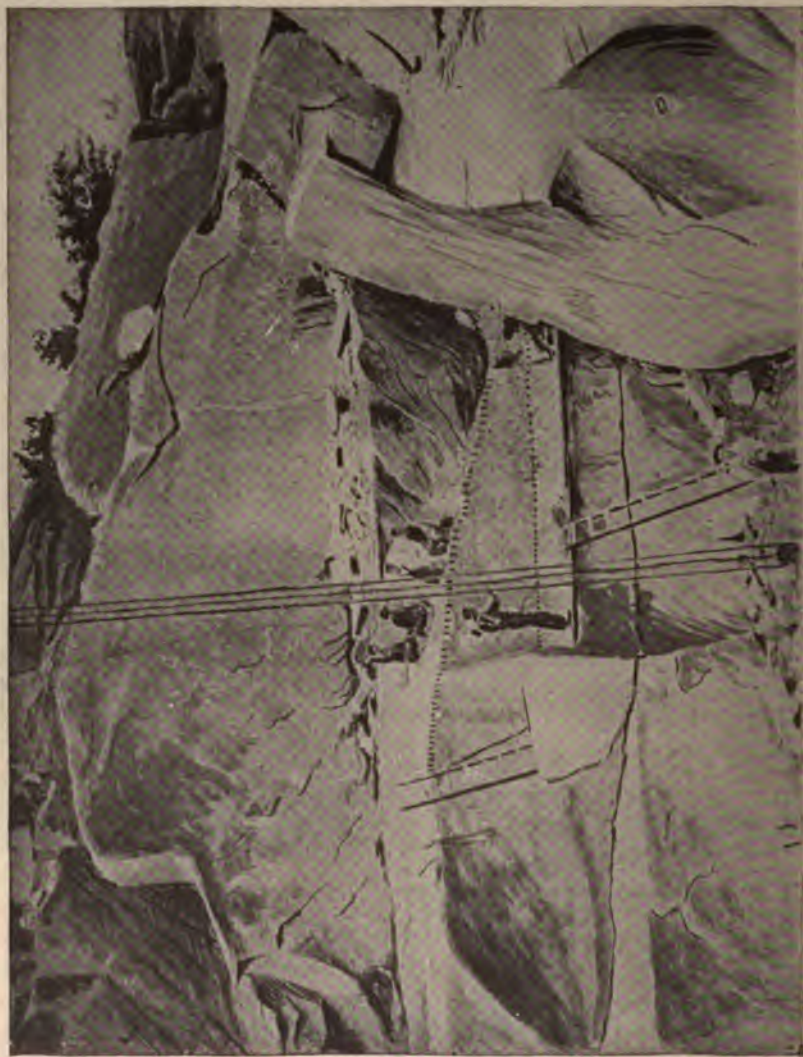


Fig. 4. Splitting up the Rock by Hand After the Blast has done its work.

from three to six feet long and two and a half feet in depth. A day's work for one man in drilling wedge holes is usually from 75 to 150 holes in a day, but occasionally an expert will drill as many as 200.

This work being accomplished, the foreman places a mark upon each

block to indicate the direction of the rift as a guide to future cutting, when the blocks are removed by the derricks (Fig. 5) and transported upon wagons to the cutting shed (Fig. 6), whither we will follow them presently. Frequently the quarrying continues to such depth that water veins are struck and it becomes necessary to provide powerful steam pumps and lines of hose and iron pipe for the purpose of lifting and discharging the water over the brink of the pit. Steam for operation of the pump, drills and derricks is usually obtained from the boiler of the hoisting engine, but sometimes special boilers are provided. The area of a quarry is frequently limited on one side by what the quarry men term a "blue seam," but which



Fig. 5. Hoisting the Blocks from the Quarry.

is known as a dike; in most cases these are perpendicular veins from a few inches to a foot in width across the granite, and are generally composed of diabase or quartz porphyry. The dikes are in most part characterized by clean parallel walls, and are supposed to be fissures which were filled with melted material injected from the earth's interior before the faulting which formed the joint planes took place. Besides the dikes proper, some of the quarries of this region are cut by numerous veins only two or three inches wide, which are probably in their nature secretions from the granitic mass formed during the cooling process.

As stated above, the quarry which we are visiting, near Pigeon Cove,

covers an area of about two acres, but of irregular depth. At the time of our visit four layers of thick granite had been quarried, and a fifth, with an area of about one acre and estimated to be thirteen feet thick, had been uncovered, and was being cut out. The texture of the rock is said to improve with the depth, it being of a lighter color and firmer grain. The top and bottom surfaces of the different layers are discolored to the depth of two or three inches, which is termed the "sap portion." For cutting into paving blocks the sap is not removed, as it is just as durable as the other portions, but from stones designed for monuments or building purposes it is trimmed off. In this connection it is interesting to refer to the skill that must be exercised on the part of the foreman in placing a blast



Fig. 6. Cutting Shed, Splitting and Trimming to Standard Dimensions.

for breaking up the large masses, especially in the quarries where the rock is employed for monument and building purposes. The superintendent of the Rockport Granite Co.'s quarries called our attention to a mass that had been detached, which he said would be worth \$15,000 when prepared for market, but which could have been spoiled by an injudicious placing of the blast. In the same quarry we saw another block just quarried that was estimated to weigh 7,500 tons, being about sixty feet long, forty-five feet wide and thirty-five feet high.

But to return to the paving work. Our block, which has been removed to the cutting sheds (Fig. 6), is now drilled and split with wedges into slabs by the cutter, in the same manner as before described. The slabs,

which are about eighteen inches across and three or four feet wide, are then laid on the ground, when the workman traces a shallow channel across the middle with a chisel or a sharp-edged hammer, and then with a heavy sledge breaks the slab along the line of the tracing; this process continues until the slab is broken up into paving blocks of proper dimensions, the New York standard being three and a half to four and a half inches in width, from eight to twelve inches in length and seven to nine inches in depth. The blocks are then placed upon a stand, shown at the back of the shed, and trimmed with a square-faced hammer, one deft blow being sufficient, usually, to remove a large chip. The blocks are then thrown through the window to the back of the shed and are ready for shipment. A cutter usually gets out from 75 to 150 blocks per day, and the price received for cutting is about \$23.00 per thousand. The cutters become very expert at the work and can trim a block in a remarkably short time. Besides the regular quarry work in this locality, a number of cutters work independently of the contractors, and cut up the granite boulders and surface rocks which are found in all the regions and sell their products to the regular dealers. From the sheds the blocks are transported in wagons to the harbor and piled along the wharf or upon the sea wall to await shipment (Fig. 7).

As no natural harbor exists on this rock-bound coast, it has been necessary to build breakwaters to provide a safe haven for the vessels. These harbors belong to private owners, and have been built at great expense. The sea wall consists of a riprap composed of refuse material from the quarries, and is necessarily very high, as the waves on the coast at times reach an enormous height. These harbors provide for vessels drawing about twelve feet of water at low tide, and these being laid alongside the wharf as shown, are loaded by means of chutes or by buckets operated by derricks. About 50,000 blocks constitute the ordinary load for a schooner, and they are shipped to all the principal cities on the Atlantic Coast, going as far south as New Orleans. For a return cargo these vessels usually bring coal which they discharge at Boston or at the coast towns of the vicinity.

Our block having completed its voyage and been discharged, on some New York wharf, for instance, is then after a little while transferred, with its fellows, in wagons, and stored along the curb of the street to be paved (Fig. 8), where it awaits the advent of the pavers. A suitable foundation having been prepared and covered with a layer of sand, the pavers place the blocks one by one in regular rows across the street, when they are thoroughly tamped and brought to a level and the joints are filled with a grouting material. Although our story is nearly completed, the real life work of the subject has only now begun, and although, at first sight, it seems to occupy a very ignoble position, being always under foot and sub-

ject to the ceaseless pounding of passing vehicles and animals, yet it contributes more largely to human comfort as a road material than the stones that enter into the construction of imposing buildings, or those which



Fig. 7. Breakwater and Harbor near Pigeon Cove, Whence the Blocks are Shipped.

mark the resting places of the dead, or compose the monuments to heroes. Granite makes a comparatively smooth pavement, is easily kept clean, and although noisy and sometimes slippery in wet weather, it is, as before stated, very durable, provided the blocks are of proper texture and care has been exercised to prevent the placing of blocks from different quarries in the same section. In case these precautions are not observed, unsatisfactory results will follow, for the blocks will wear unevenly and produce a rough surface.

It must not be inferred from the above, that granite for paving purposes is quarried only on Cape Ann, for this industry is extensively conducted in other localities throughout New England, but chiefly in Quincy, Mass., and on Rockland, Fox, Deer and Hurricane Islands off the coast of Maine. The quality of the blocks varies with the different localities, but it is claimed that there is no paving granite quarried superior to that found on Cape Ann.

Our story proper is concluded, but there is much of interest both physical and commercial that clusters about the region from whence our paving block was quarried and upon which we may dwell with profit. The first relates to dikes, of which there are more than 360 in the Cape Ann region, and of which we have before spoken. Their formation and the peculiar manner in which they cut the granite is strikingly illustrated in Fig. 9. The presence of these dikes has so much to do with the contour of the rocky shore, for, being generally of a softer material than the granite, they yield to the erosive action of the sea which forms chasms or sea caves in the direction in which the lines of weakness extend. In sections where the dikes are not numerous, and the original inclination of the shore toward the sea is not abrupt, the effect of the marine action is not very apparent (Fig. 10), as the surges slip up over the slope and expend their energy in lifting the mass of water above the base.

The coast of Cape Ann is cut at frequent intervals with small fiord-like embayments, and these bays afford a place of deposit for the materials derived from marine action. Much of this beach accumulation is composed only of pebbles or boulders measuring from two inches to two feet



Fig. 8. Final Stage, Placing the Blocks in their Little Bed.

in diameter, the mud produced by the wearing of the pebbles on the beach having been drawn away into the depths of the sea by the undertow. These pebbles are often thoroughly polished by marine action, and when of suitable size and shape—from six to ten inches—are frequently col-

lected by the inhabitants who build them into garden walls, or place the more ornamental stones along their walks, or build them into ornamental towers which answer for gate posts. The material from which the pebbles are rolled consists in part of glacial detritus in the form of small boulders lying upon the sea floor, but which have been detached from their beds and transported within the area of wave action by the growth of seaweed



Fig. 9. *Dikes Cutting Granite*

upon their upper surfaces. This action of the seaweed is brought about partly by the impulse to float due to the relative lightness of the plants, and in a large measure through the pull which the deep currents are able to make on the extended fronds of the seaweed; thus in time the pebble is detached from its ancient fastenings and is brought into the mill of the surf when it is separated from the plant that brought it ashore, and is rolled about the beach until worn out or becomes impounded in some beach pocket.

Another portion of pebble material consists of blocks of granite which have been ruptured from the cliffs by the action of the waves and frost, but a good many of the small beach pockets, especially in the vicinity of Halibut Point, are almost entirely composed of rounded waste from the quarries, or from angular stones which have been discharged into the sea from excavations made in the headlands around the cape by parties exploring for suitable quarry stone.

Still another source of supply is found in the riprap of which the breakwaters are composed. The pebbles formed from quarry stones are termed artificial pebbles and are readily distinguished by the eye from those

formed in the natural way of material broken from the cliffs, or from deep sea deposits, as the former usually retain a blue-gray hue of the ordinary quarry stones, while the latter are generally discolored by decay. The rate of wear which the surges produce on the angular masses from the quarries is very considerable, and it only requires the exposure of a single year to the full beating of the waves to produce a considerable rounding of the mass, while in ten years a large block will wear away to the familiar form of a beach pebble.

Other interesting features of this region are the evidences—consisting of the scouring action of the waves and the indentations which they have produced on the bed rocks—that the sea has stood in ages past at successive levels above its present tide mark to the height of 150 feet, and also that it has retreated to a still lower level; and there are now evidences—consisting of submerged forests—that the coast line is gradually sinking. While these are interesting features we cannot dwell upon them, and must refer the reader to the Ninth Annual Report of the U. S. Geological Survey for further physical features.

We now turn to a more practical feature and one which is destined to



Fig. 10. Sea Shore Near Pigeon Cove, Showing the Effect of Wave Action.

work considerable change in the character of the extreme coast line and in the business of the locality. We refer to the extensive breakwater now being constructed by the government near Rockport, and which when completed will provide one of the largest harbors of refuge on the Atlantic coast. The breakwater is located some distance from the shore and extends from Straitsmouth Island toward Andrews Point. The wall is

being built of granite which is furnished by the Rockport Granite Co. and the Pigeon Hill Granite Co. The foundation will be of riprap, but from near the surface a solid sea wall will rise sufficiently high to protect the harbor from wave action, and into which coasting vessels can take refuge during storms. The material is transported from the quarries near by on tram cars. A deep cut having an arched bridge leads from the quarry, so that it is not necessary to hoist the rock except to place it upon the cars which descend by gravity and deliver their loads directly upon dumping scows which are towed into position by tugs, and discharge their contents upon the line of work. This breakwater when completed will inclose 1,664 acres of good anchorage which, it is estimated, will accommodate 5,500 vessels. The entrances will be located so that vessels can enter or leave with the wind from any point of the compass.

The importance of this work can be readily seen in the fact that from 78,000 to 100,000 vessels pass this point annually.

This illustrates another way in which granite is utilized and made to minister to human progress and human comfort, and, as in the case of coal, emphasizes the wise prevision made by the Creator in ages past for the present comfort of man.



Fig. 11. Steam Drill and other Tools Employed for Cutting Granite.



BASSANIO.

BASSANIO, as his name implies, is an Italian, and although he has been in this country for many years, he is still a Tuscan in spirit if not one in speech.

When living in the sunny land of his birth, Bassanio's career was checkered and full of vicissitudes which, to one possessed of a reasonably keen sense of humor, must ever be picturesque and interesting. Having manifested the instincts and inclinations of a romanticist, at the tender age of six years, his father apprenticed him to a sculptor, hoping that he might one day halo his name in everlasting fame. He made great progress in his art, and more than fulfilled the predictions of his master, when the restlessness of his proud spirit asserted itself and caused him to leave the *atelier* and its artistic influences, to go out upon the road and cast his fortunes with a company of bandits. To be sure the bandit, while he may be a poet at heart, is less impressionistic than is a sculptor, even when the sculptor is a realist, and when Bassanio abandoned the art of carving in marble to embrace the less dilettante pursuit of carving in human flesh, he felt that he was moving in quite as high an atmosphere of romance and that he was not losing caste. It was simply a step, he argued from the carving of the comparatively remote and unhuman mythologic god to that of the occasional English tourist, whom a kind and smiling fortune might cast in his way.

I have no means of knowing why he subsequently retired from the profession of a bandit. Possibly the demands and duties of his position were too engrossing for one of his refined poetic temperament. Possibly the craft was without a code of ethics, such as would meet with his favor and indorsement, and then a lapse of business activity may have ensued which was instrumental in dissolving the partnership and releasing each member from further obligation.

At any rate Bassanio came to America and soon satisfied the friends of his youth, of whom he had a handful in this country, that he had forever ceased

to know the yearnings and ambitions that fire the heart of the bandit. They fully believed this when he refused a lucrative position that was offered him by a plumber, who, having apprised himself of Bassanio's former calling, saw a way to repair his shattered fortunes—shattered by a mild winter, and not through professional incompetence or neglect—and lost no time in making a business proposition that was looked upon with contumely and coldly rejected. It seems ridiculous to picture Bassanio as a plumber; and when he refused to become a member of that great fraternity, his action was regarded by his friends not only as a satisfactory evidence of his proud and hyper-sensitive spirit, but also as a golden proof of his complete reformation.

Nor did he embark in the business of grinding an organ, as the emoluments of such a pursuit were not in accordance with his ideas of pecuniary satisfaction, especially when he considered the weight of his musical instrument, and the heroic patience necessary to the ordeal of listening to the same airs all-day long. Consequently he attached himself to a well-known restaurant, where before joining the corps of waiters, he occupied the loftier position of carver. I have often watched him with feelings of admiration for his manhood which made it impossible for him to beg, or to seek to earn a livelihood by peddling plaster casts from door to door. I have often watched him, his fierce moustaches bristling, while with one deft stroke he carved a slice of roasted beef. Occasionally while performing this office his features were lighted by a fiendish smile such, I imagine, as he once bestowed upon his victim while eliminating his ears to post to his wife with the message that his hands would follow in the course of a day or two if a certain amount of money was not forthcoming. And yet while I admired his manhood and moral courage in accepting the menial position he occupied, when he seemed born to be a cavalier, yet I felt sorry for him, for when I viewed him toiling in his great apron and paper cap, I fancied I saw Ariosto composing panegyrics for a spring tonic, or Alfieri reporting a dog fight for one of the great dailies.

After a while Bassanio's fame as a bandit extended from one end of the restaurant to the other, and the patrons of the place asked so many questions with reference to him, that the proprietor deemed it expedient to make him a waiter that he might relate his exploits and thereby furnish entertainment for the regular customer. While he acted in the capacity of waiter, he related to me the facts which I have here written down. One day I went to the restaurant, after an absence of a month in the mountains.

"Where is Bassanio?" I asked of a new waiter.

"The bandit?" he asked.

"The same."

The waiter pointed and said: "He spends his time prowling up and

down the back street, and as he seems bent upon vengeance, we are having the proprietor attended by a detective."

"A volcanic irruption of the bandit spirit," I mused; "the smouldering fires had to burst forth and assert themselves at last," and then I said:

"What's the matter?"

"He was discharged the other day."

Without further ado I looked out of the window, and sure enough Bassanio was stalking up and down the sidewalk in a very tragic manner. His moustaches bristled with more than their usual vim, his eyes were dull and sullen, and if he had had russet boots to match his slouched hat and cloak he would have looked the open villain to the very life. His hand appeared to be upon the handle of his stiletto, and he seemed like a tiger ready to spring.

"And why was he dismissed?" I asked, in some surprise.

And when I learned the cause of Bassanio's dismissal, I could not help laughing, for I then felt for the first time that he had a fatal sense of the ridiculous, without which he would doubtless still hold his old position which was anything but in harmony with the prestige of a bandit. And the proprietor, I was then informed, would listen to no intercession for Bassanio. He was a champion of correctness and detail, and could not condone the offense of the Tuscan. And poor Bassanio walks the street in disgrace for this offense:

One day a meek-whiskered rustic took a seat at his table and asked for some oysters on the half-shell. And when they were placed before him, he eyed the oyster fork with contempt and suspicion, and threw it down in disgust, characterized it as a tooth pick, and said he wanted some kind of utensil that was large enough to eat with. It was then that Bassanio was dismissed by the proprietor who heard him sarcastically remark to the rustic, as he laid a knife, a tablespoon, and a pair of sugar-tongs before him: "Taka your choice!"

R. K. Munkittrick

"I like *STONE* much better in the new form. Feel as if I could not do without it now, as I have had it every month for so long a time."—*M. H. Gale, Cleveland, Ohio.*

"We inclose herewith check to renew our subscription to *STONE*. We have been subscribers ever since you started the publication, and have gained much valuable information from it. It has been an interesting magazine from the start and seems to improve with every number. We consider it the greatest benefit to us of any periodical and do not think any quarry or stone dealer can afford to do without it."—*New England Brownstone Co., Cromwell, Conn.*

WASHINGTON, D. C., NOTES.

During the recent inaugural celebration in this city the Lafayette statue in the square which bears the name of the great French patriot, was used as a brace for one of the platforms which held a large crowd of people who witnessed the inaugural parade. The support rested upon the marble base of the statue. The figure symbolical of faithful America handing its best foreign friend the sword of victory is lost to view. Lafayette himself could only just get a peep at the "Man of Destiny" when he passed in his triumphal march. It is a matter of record that, contrary to all usage and custom, there has never been any unveiling ceremonies in connection with this, the most artistic public work of art in the city. Congress refused to make sufficient appropriation therefor, and for the same reason no inscription of any sort has been placed upon it. Unblessed by the eulogies of patriotic oratory, unnamed through the penury of congress, it has since become a portion of a brace for a reviewing stand.

This profane use of a monument, such as this one is, was very generally criticised during the inauguration. Several communications were written by patriotic visitors to the city newspapers, and a good deal of comment was created thereby. The contractors of the stand deny that criticism belongs to them. Congress having authorized the erection of the stand, they claim that a good sum was paid for the privilege of erecting it and renting seats. They say that every precaution was taken to protect the monument, even boxing it up in the rear, so that Lafayette and his companions should not be turned into a grand stand, as was the case during the G. A. R. encampment. The contractors declare that the monument has not been injured in any way, and they have Col. Ernst's authority for the statement that the sword, which is bent, was in that condition when it arrived from Europe. The marble stains which were referred to by some critics, were not caused by nail rust as stated, but by drippings from the bronze. Col. Ernst has endeavored in every way possible to remove the stains, but has failed. There is, however, a chip in the marble base, for which the contractors may, or may not be to blame.

A new departure in the matter of locating equestrian statues is to be made in that of General Hancock, for which Elwell the sculptor has the commission. Instead of being erected in a conspicuous place in a populous city, as is usually the case with such memorials, it is to be placed on the battlefield of Gettysburg. The horse will be nine feet high and the figure in proportion. The sculptor has chosen as a site the place marked by a slab as the farthest point reached in the charge of the Southern troops, and Hancock is to wave his hand in the direction of Little Round Top.

When the wife of the new Secretary of Agriculture, Hon. J. Sterling Morton, died, her husband, who was greatly devoted to her, erected over her remains a tombstone which bore this inscription: "Caroline French, wife of J. Sterling Morton and mother of Joy, Paul and Mark Morton."

"Why did you put the boys' names in?" inquired a friend of him one day.

"Because," said Mr. Morton, "I took my boys out to the cemetery and I showed them their mother's grave. 'Boys,' I said to them, 'your mother is buried here. If one of you ever does anything dishonorable or anything of which she would be ashamed if she were alive, I will chisel your name from her tombstone.'"

It is hardly necessary to add that the three names are still there.

"The progress of art in America," said Mr. R. H. Park, the sculptor in this city, recently, "has been phenomenal in twenty years. Two decades ago, outside of New York, Boston and Philadelphia, there was no standard art academies, and those in these cities were small affairs compared to the many now flourishing in these centers. Now in every city in the east and west are found great art schools and academies, to say nothing of the numerous private schools. The appreciation of art in America is becoming more keen and the work of our own artists received with the honor and merit due them."

Mr. Park has lived in Florence, Italy, for the past twenty years, but he is a native of Connecticut, and is the sculptor of the Chicago Columbus monument, the Hendricks monument and the silver statue of Justice, for which Miss Ada Rehan posed, and which will form the principal exhibit of Montana at the World's Fair.

Mr. Dunbar, the sculptor, is preparing to shortly commence modeling a figure of the late Senator Kenna, of West Virginia, with the view of securing the commission for the statue of that gentleman, which is to be one of the contributions of the state of West Virginia to the hall of statuary in the capitol building, for the execution of which the legislature of that state recently made an appropriation of \$5,000.

A gentleman here, a few days ago, said that in the machine shop of Jos. Clarkson & Sons, in Baltimore, stands a statue of the late Salmon P. Chase, Secretary of the Treasury under President Lincoln and afterward Chief Justice of the United States Supreme Court, which ought properly to adorn one of the public parks of this city, both on account of its artistic merit and its interesting history.

The owner of the statue, Mr. Michael T. Horner, purchased it in 1882 in an incomplete state, from Joseph A. Buck, who died recently, and who for sixty years was a metal dealer in Baltimore. Mr. Buck obtained it from a

Washington metal dealer who had purchased it at a sale of the effects of Clark Mills, the sculptor.

According to Mr. Buck's statement, the United States government contracted with Mr. Mills for bronze statues of President Lincoln's cabinet officers, which were to be given a place in Washington square, and gave the sculptor the bronze cannon captured in the Mexican war with which to make them. The price to be paid for each statue, it is said, was \$15,000. The work on the statue of Chief Justice Chase was done at Mr. Mills' foundry, near Washington. While the piece was in the sand Mr. Mills died. The statue then was complete except as to the coat tails. They have now been added, and the statue has been cleaned by Mr. Horner. It is of bronze, twelve feet high and weighs 3,000 pounds. The statue represents Mr. Chase in an upright position. The right hand is extended and in it he holds a package representing national bank notes. The left hand of the statue is resting on a staff. The features are said by those competent to judge, to resemble those of the Chief Justice in a remarkable degree. An effort will be made to sell the statue to the United States government or to the state of Ohio, of which the late Chief Justice was a citizen.

The Census Bureau has completed the marble and stone statistics at Long Island City, New York, reporting the existence of four establishments working in marble and stone, and employing an aggregate capital of \$303,222, subdivided as follows: Hired property \$20,422, value of plants \$197,500, being \$110,000 worth of land, \$13,000 in buildings, and \$74,500 worth of machinery, tools and implements; total live assets \$85,300, being \$20,000 in raw materials, \$31,000 finished product and stock in process, and \$34,300 in cash and accounts. The aggregate wages paid is \$190,844, and the average number of hands employed during the year is 162, all of whom are males above 16 years of age. The aggregate cost the of materials used is \$106,815, being \$100,300 for principal materials, \$2,905 for fuel, \$280 for mill supplies, and \$3,330 for all other materials. The aggregate miscellaneous expenses are \$6,069, of which \$1,544 is for rent, \$1,800 for taxes, \$525 for insurance, \$2,175 for ordinary repairs of buildings and machinery, and \$25 for all other sundries. The aggregate value of the goods manufactured is placed at \$370,000.

Similar statistics regarding marble and stone working establishments in Topeka, Kan., have been completed. The Census finds five concerns in that place engaged in this industry, employing an aggregate capital of \$36,525, subdivided as follows: Hired property \$6,000, value of plants \$13,625, being \$4,000 worth of land, \$1,450 in buildings, and \$8,175 worth of machinery, tools and implements; total live assets \$16,900, being \$1,700 in raw materials, \$4,200 finished product and stock in process, and \$11,000 in

cash and accounts. The aggregate wages paid is \$27,140, and the average number of hands employed during the year is forty-six, all of whom are males above sixteen years. The aggregate cost of the material used is \$30,343, being \$28,031 for principal materials, \$2,101 for fuel, \$50 for mill supplies, and \$161 for all other materials. The aggregate miscellaneous expenses are \$1,807, of which \$474 is for rent, \$188 for taxes, \$71 for insurance, \$155 for ordinary repairs of buildings and machinery, \$360 for interest on cash used in the business, and \$559 for all other sundries. The aggregate value of the goods manufactured is estimated to be \$69,606.

According to the latest statistics compiled by the customs division of the Treasury Department, the imports during the month of February, of marble and manufactures of marble, reached a valuation of \$89,856, which is nearly double that of February a year ago, when \$46,314 worth were imported. These imports for the eight months ending in February, amounted to \$699,421, against \$547,243 during the corresponding period in 1892.

The imports of stone and manufactures of stone, including slate, were worth \$35,267 in February, against \$31,754 in February last year. For the eight months ending with February these imports were valued at \$244,898, against \$296,181 for the corresponding period of the previous year.

Thus it is seen that the total value of the imports of marble and stone, and the manufactures of same, during the month of February, was \$125,123, which was largely in excess of the value of these imports during the same month in 1892, when \$78,068 was the total value. During the eight months ending with February the total reached \$1,044,319, against \$843,424 during the corresponding period of 1892.

The exports from the United States, of marble and stone in their crude condition, reached a value in February of \$10,151, compared to \$8,822 in February 1892. These exports, however, for the eight months ending with February, were less than they were during the same eight months a year ago, the comparative figures being \$94,798, against \$115,343.

The manufactures of marble and stone, including roofing slate, exported from this country in February, were worth \$57,095, against \$44,490 exported during the month of February last year. These exports for the eight months ending with February, were considerably in excess of those of the like period last year, the contrasting figures being \$430,582, against \$333,996.

The total re-exports of marble and stone, and manufactures of same, amounted to only \$96 worth in February, against \$55 in February last year, and \$681 during the entire eight months ending with February, as compared with \$2,473 during the corresponding period of the year before.

The value of statuary imported in February was \$100,330, against
D—Stone.

\$122,064 imported in February last year. The value of these imports during the eight months ending with February amounted to \$1,659,279, against \$1,480,259 during the corresponding period in 1892.

Senator Proctor, of Vermont, is having built in this city, six handsome houses, having fronts of white marble. These residences will be three stories and basement in height, and have a frontage of twenty feet each, and will be supplied with all modern improvements. The prediction has been made that this is but the advance movement towards a more general utilization of marble in the building fronts of residences in this city.

The contract for the new post office building in this city has been awarded to the Bodwell Granite Company, of Rockland, Maine. The granite work alone will aggregate a cost of \$500,000. This will be done at Vinal Haven, and will give employment to a large number of cutters for nearly three years.

Mr. William H. Evans, president of the Evans Marble Company, of Baltimore, leaves to-day for Genoa, Italy, to purchase marble for the interior decoration of the Congressional Library building in this city, the contract for which work was awarded his company some time ago.

The Bureau of the American Republics has been informed that a deposit of gray lithographic stone, which is described as magnificent, and equal in grain and quality to the lithographic stone obtained in France and Germany, has been found in the Cerro de la Origi, near Yanitepec, in Mexico.

GEO. W.

O'ERTOPS THEM ALL.

"Inclosed please find postal note for subscription for STONE another year. I would be lost without it. It contains more instructive reading than any magazine I have ever seen on the subject of stone."—*M. Alexander, Buffalo Gap, S. Dak.*

"I do not wish to be without STONE and I consider two dollars invested in a subscription as well invested money."—*Asher Bassford, St. Paul, Minn.*

"We are very much pleased with STONE and believe it is the best publication relating to stone, and its various uses published at the present time."—*Wm. Graveson & Co., Cincinnati, Ohio.*

"STONE certainly is the best magazine it has been my fortune to read. I am surprised how you can give so much first-class matter at so low a price."—*George Leuchars, Great Falls, Mont.*

"I must say that your publication is the best of the kind in the country in relation to the stone trade and I gladly send you my mite towards sustaining a good publication."—*John Beattie, Lecte's Island, Conn.*

BUILDING BUDGET.

Philadelphia Points.

Since my last monthly letter operations in which stone will be a leading feature, have received quite an impetus in this locality.

W. H. MacCollin, architect, 913 Walnut street, has prepared plans in detail for four large four-story brownstone houses to be erected for the well-known merchant clothiers, N. Snellenberg & Co., on Broad street near Susquehanna avenue; all to be very ornamental in design, and interior minutiae to be of the best.

On inquiry it is learned that an entire block of stone four and five-story dwellings, will be erected by a syndicate who have just purchased the site of the late Deaf and Dumb Institute and which are to be upon a very unique and model design, either side of these structures are to possess fronts with a magnificent courtyard of fifty feet in middle of the plot interspersed with fountains, flower beds, etc., from plans by Cope & Stewardson.

Another operation in which Port Deposit granite will be a factor, will be the large cold storage warehouse to be erected on Delaware avenue below Spruce street, to be six stories high and at least two of these will be of the material mentioned. This latter structure is to be built by the Pennsylvania Warehousing and Safe Deposit Co. of this city and will cover an area of 64 and 120 feet.

Work has just been started upon the new building for the P. R. R. Branch of the Y. M. C. A. in West Philadelphia, which will be constructed of stone and brick four stories high and highly ornamental. Also a large police patrol and fire station which will be erected by the city authorities at Westmoreland and Second streets, to be entirely of Conshohocken and Elyria stone, with slate roof, and modern improvements on interior in which considerable stone work will also enter.

John M. Sharp, the well-known builder of this city, has also started the foundation for a fine six-story hotel to be of stone and brick at Twelfth and Arch streets, the former being Indiana limestone of a hard quality. Plans for which were prepared by Angus S. Wade, architect, Hale Building.

One of the most elegant rural homes in this country is about to be erected by millionaire William W. Harrison, sugar refiner, at Glenside, near this city from plans drawn by Horace Trumbaur, architect, 310 Chestnut street, he having prepared the former drawings for the house recently destroyed by fire. The new structure will be 186x350 feet, three stories high and principally of local and Indiana limestone, with Spanish tile roof. The main stairway will be 20 feet in width and built entirely of Italian marble of a very superior quality and workmanship, also considerable marble, tile and mosaic work throughout the various halls, rooms and vestibules; it will also contain Roman baths, etc. in stone and total cost will reach about \$250,000.

Culver & Hudson, architects, of Williamsport, Pa., have made plans for a very large and handsome City Hall to be erected in that city by the municipality and for which estimates are being made. It will be four stories high of brick and Indiana limestone, slate roof, and quite ornamental in design.

E. F. Durang, Architect, of this city, has made plans for a parochial house to be

attached to the Church of Our Lady of Mercy, Broad street and Susquehanna avenue, to be four stories high, of granite and Indiana limestone and entirely in conformity with that part of the church now completed.

In order to give credence to the assertion that the year 1893 will be a prolific one in the construction of new buildings, I find in the month of February a total of 289 operation, whilst for the next month that of March, the great increase to 1524 total, being 1233 over the second month of the year. In order to show the use of stone entering into this work, I find that in the latter month, of the total number 1229 were entirely new dwellings, two, three and four-story, in all of which the steps and facings are either sandstone or marble, with perhaps a slight exception here or there of granite work. If this ratio be sustained throughout the country in large cities it augurs well for the season of building now upon us.

Detroit Dots.

As the class of buildings improve with the growth of the city stone comes into more general use, and the coming season will certainly witness the largest amount of building with stone in the history of the city. Indeed, it has come to be considered that stone is necessary in order to give a structure that degree of respectability that is desired in certain particular classes of buildings. Very little brick is now used in church building, and a building to be devoted to art, music or any of the aesthetic uses would be regarded as anomalous almost if the walls were to be of that material. The use of stone by foreigners in all structures of the substantial class has doubtless contributed to this sentiment fully as much as the merit of the more durable material, for it cannot be gainsaid that when people arrive at that degree of financial ability that they are able to erect buildings of the better class they are as apt to be influenced by what is "done abroad" as are the ladies to be governed by the Parisian fashions.

Work on the new masonic temple in this city will begin in a few weeks. It will be of stone, but of what variety is as yet an unsettled question. The cost of the temple is to be in the neighborhood of \$400,000 and is designed to be the architectural ornament of the city. The new Home Savings Bank, work on which will begin May 1 will have the first two of its eight stories constructed of solid buff sandstone. Interiorly the floors will be marble and tile, and all the wainscoting of marble. The Union, Trust Company have begun making soundings for a foundation for their new twelve-story building on the corner of Griswold and Congress streets, and an immense amount of stone will enter into the substructure and first two or three stories, mostly upper peninsula sandstone. The smaller jobs in which stone will enter to a considerable extent during the season are legion.

The fact that the federal building, now in course of erection here, is of Illinois free-stone has caused a general protest on the part of the people, because of all the states in the union claiming excellent building stones, Michigan people regard Michigan as first and foremost. To have stone brought, therefore, from a neighboring state, a prairie state whose stone deposits cannot possibly be equal to our own, is humiliating in the extreme, and a vigorous effort will be made by our loyal builders to obtain the appointment of a Michigan man to the position of supervising architect at Washington under the new administration, as it is believed he would introduce the Michigan material wherever it could be done judiciously.

V. W. RICHARDSON.

Minneapolis and St. Paul.

Minnesota is to have a new capitol building. That much is settled. It is supposed to be settled also that the structure shall not cost the taxpayers more than \$2,000,000. Opinions differ as to how well this part of it will stay settled. The bill providing for a commission to make a start toward a new state house has just been signed by the governor. It is not specified what material shall be used beyond the provision that it shall be fire-proof. There is little doubt, however, that the walls will be of solid stone presumably granite. St. Paul would hardly be satisfied with anything less, after Minneapolis has set the pace with its magnificent granite pile. Competitive designs are to be called for under restrictions which the architects do not like and to which they claim no legitimate architect will submit. Ten years is allowed for the construction of the building, which must be upon the same site as the old. It is specified that all labor and material shall be furnished by contract. The commission may let the whole in one contract or divide and sublet it.

The governor has also just signed the bill which gives the Minneapolis Court House and City Hall Commission \$1,000,000 more to spend. This will not finish and furnish the building, but it will go a good ways toward it. There are some nice contracts in store here for some stone and marble and tile men. Work has been dragging lately owing to the legislative "hitches"; but may be expected to jog right along hereafter.

James Baxter, the head of the firm which had the contract for the stone work on the big Minneapolis public building, died a few weeks ago from cerebral trouble. The firm, James Baxter & Son, will go right on with all contracts, but Mr. Baxter will be sorely missed. He has been for years prominent in the business world and was held in universally high regard. He has built some of the finest residences and business blocks in the city and Northwest, including Senator Washburn's house. He was identified with the Ortonville Red Granite Co. He was fifty-seven years old and left an estate which probated at about \$80,000.

Uncle Sam has let recently a mammoth contract for the cut-stone and brick work on the new federal building in St. Paul. Hennessey Bros., of St. Paul, are the lucky bidders out of a long and distinguished list. Here is the list complete: Mt. Waldo Granite Co., Me., \$317,000; Hennessy Bros., St. Paul, \$287,800; George J. Gitts, St. Paul, \$375,667; Foster & Scott, Minneapolis, \$398,388; L. L. Leech & Sons, Chicago, \$320,000; G. C. Ortonville, Fargo, \$362,000; Lauer Bros., St. Paul, \$299,500; J. D. Morgan Manufacturing and Construction Company, St. Paul, \$342,000; A. Bassford, St. Paul, \$298,360; Charles W. Gindell, Chicago, \$320,897; John Nevins & Ashwood, St. Paul, \$488,191; G. C. Amberg, Chicago, \$348,659; George F. Bodwell, Chicago, \$346,142. Work is now in progress on the excavation and it is not likely that the Hennessys will be able to get to work before fall. The St. Paul Stone-Cutters' Union has made a formal request that all the stone for the building be cut in St. Paul. This will probably be the case as a loyal local firm has the contract.

A handsome marble wainscoting is being put in the government building in Minneapolis. It will encircle the lobby, four feet high and line the two staircases to the second landing. Vermont marble of delicate coloring is being used, shading from a light blue at the top to a dark blue in the panels which are quite ornamental.

Architect A. F. Gauger, of St. Paul, has made plans for a fine six-story business block which C. E. Dickerman will build at the corner of Sixth and Minnesota streets, St. Paul. Redstone trimmings will be used with the pressed brick. Lathrop Mussetter has leased the main store room and will fit up there the finest drug store in the city.

Hermann Kretz & Co., of St. Paul, have plans for two nice brownstone residences,

which Joseph Lockey will build on Summit avenue near St. Albans. They will each be ten-roomers and will cost about \$10,000.

The Minneapolis Academy has a handsome brownstone building in Southeast Minneapolis. Caton's Business College has just been consolidated with the Academy and the two will be maintained under the title, the Columbian College Association. This will necessitate the erection of another building or addition to the present. The plans are for a structure similar to the academy building, sixty-six by sixty-six, with brownstone in the walls.

The omnibus appropriation bill, now under fire in the legislature, provides \$175,000 for building a library and assembly hall at the state university, \$120,000 for a woman's wing for the Fergus Falls insane asylum and a long list of lesser amounts for various school and asylum buildings. The university appropriation will probably go through. The fate of the rest of the list is problematical.

A small scare was occasioned by reports about the condition of the stone walls of the Central High School building in Minneapolis. The building consists of an old part and a new, both of the common blue limestone of our quarries. Expert examination revealed some rather bad cracks in the walls due to the settling of the buildings. They are not dangerous and have been patched up. Some of the capstones and lintels were found in bad shape, from the effects of frost in some cases. This stone is not very hard, and yet samples of it can be found in some of the oldest buildings in the city which have stood the inroads of time bravely.

Minneapolis is now advertising for 15,000 lineal feet of natural stone curb. The time expires April 14. No stone pavement will be laid this season.

Ring & Tobin, the stone contractors, have been sued by the Pioneer Fuel Co. to recover \$1,560.84. It is claimed that the firm occupied leased ground for its yards after the lease had expired and did not pay for it as the company thought it should.

The Minneapolis library board has accepted the plans of Corser & Aldrich, of this city, for a \$10,000 branch building to be erected at once in North Minneapolis. It will be a two-story building with stone trimmings.

It is reported that Architect Harry Jones has in his office plans for another immense mercantile block, to be built at the corner of First avenue South and Second street, Minneapolis. It is to be fire-proof, iron construction, with walls of granite up to the second story and Roman brick above.

In both the cities building operations are opening up finely. The weather is now favorable and the dirt is flying in all directions for foundations for great business and residence buildings. It promises to be the most active building season Minneapolis has ever had, and that is saying much.

W. J. Dwyer & Bro., a large music house, is putting up the superstructure for a five-story brick block of very elegant appointments, in St. Paul. Mosaic flooring will be a feature.

Geo. C. Farnham, who has been in the marble business in Minneapolis for many years, has bought a quarter acre in the heart of the city and will put in extensive marble works, doing his own manufacturing hereafter. He paid \$25,000 for the property.

Judge Otis, of St. Paul, will build a three-story brownstone apartment house on Summit avenue near St. Peter, estimated to cost \$35,000. W. H. Lightner will also build a brownstone residence on Summit avenue opposite Farrington.

Architect Kretz has completed plans for a six-story brownstone apartment house, for Ross Clarke. It will cost \$150,000.

J. G. Emery, of the Minnesota Granite and Polishing Co., died a few weeks ago, after a protracted illness.

The secretary of the Minnesota Board of World's Fair managers is endeavoring to get up an exhibit of the manufactured stone products of the state.

The stones to make up the archway at the entrance to the mining booth in the Minnesota contribution to the World's Fair are being shipped and the plans for the grand arch are complete. The stone used in the arch itself is of fifteen varieties, set in as many pieces. On the face of each stone is cut the name of the variety. There are St. Cloud pink granite, white granite, Ortonville granite, Sioux Falls jasper, Rockville pink granite, Mankato limestone, Kettle River sandstone, Frontenac limestone, Kasota limestone, Brownburgh limestone, Minneapolis bluestone, Mantorville limestone, Winona limestone and Red Wing limestone. The keystone will be of Duluth brownstone. The piers will be constructed of Kasota and Mankato stone, alternately. Two shafts of polished granite will be set in the pier, and a Romanesque capital is the immediate support of the arch. The spandrel, frieze and cornice are of Duluth brownstone. On the frieze is engraved the word Minnesota, and a border in a Greek design is above it. The arch will be ten feet across, twelve feet from base to cornice, and the pillars will be two feet thick. Two end posts will be erected also. They will be constructed of the same stone as the piers, and will be uncrowned. The booth will be further inclosed by a railing, and a series of show cases will extend along this railing which will contain specimens of the different ores, clays, etc., found in the state.

Mankato's stone fountain is now complete and ready for shipment. It is an imposing affair.

CHAP.

Northwestern Nuggets.

According to official reports the sales of granite in Minnesota during the year 1889 footed up only \$356,780. There has been a considerable increase since then, but it is evident that the resources of the state are not being developed so rapidly as they might and should be. There is an excellent opening here for the investment of capital.

Port Wing is the name of a new town recently platted in Bayfield county, Wisconsin, in the vicinity of which red sandstone of good quality and color is said to abound.

A handsome stone from Elm Creek quarry, near Hot Springs, will enter largely into the construction of the Masonic temple at Deadwood, S. D.

A bill proposing to build another normal school, to be located at Tracy, Minn., stipulates that stone cut at the St. Cloud Reformatory shall be used in the building.

Wisconsin cities are at war over the possession of the great Ashland monolith. Frederick Prentice presented it to the state with the idea that it would be sent to the World's Fair. It looks as though it would not get to the Fair, and so the cities are all after it.

The proposed public building at Sioux City, Iowa, is to have a rock-face stone exterior, with ornamental moldings over the entrance and molded band and sill courses. The kind of stone has not been decided on.

A large amount of cut stone is going into the mammoth brewery building which the Montana Brewing Company is putting up at Great Falls, Mont. The main walls are brick.

The first stone for the government building at Fort Dodge, Iowa, was swung into place the other day. Graves & Hackett have the contract. It will be of granite and brick.

It will take 1,600 cords of stone to construct the dam and foundations for the new paper mill at Nekoosa, Wis.

The Superior Cut-Stone Company reports large contracts at Kewaunee, St. Louis and St. Paul.

The Grand Forks (N. Dak.) Young Men's Christian Association building, for which Architect Smith, of that city, has been making plans, will be of stone and pressed brick. At the main entrance will be an imposing stone arch and vestibule.

A fine six-story stone and brick building will be erected at Sioux City, Iowa, by the O'Harrow, Rice & Rederich Company. There will be a marble staircase to the first landing.

T. N. Matthews will build at Spearfish, S. Dak., a fine business block with brown-stone front.

Architect G. A. Tenbusch, of Duluth, has made plans for a handsome school building to be erected in that city at once by the Benedictine Sisters. Along the first story front will extend an arcade consisting of stone columns with finely carved capitals from which will spring pointed arches. Portage sandstone will be used as trimming. The first floor corridors will all be tiled.

The Iron River Brownstone Company has been incorporated at West Superior, Wis.

W. G. Frisbie has the contract for the stone for the new court house at Great Falls, Mont. The hardest quality of native sandstone will be used.

J. T. Fisher, of Rock Rapids, Iowa, will build, at Luverne, Minn., a fine three-story block of jasper.

E. Hill Turnock, the well known Chicago architect, was in Minnesota recently and visited St. Cloud with a view to arranging with the polishing works there to polish the stone for B. Edwards' big jasper building in Chicago.

Granite, instead of sandstone, will be used for the trimmings for the handsome new library building at Butte, Mont.

At Mankato, Minn., the pavement question is being agitated. It has been suggested that the main street be paved with Mankato stone as an experiment.

Work at the Hutchison stone quarries has been delayed somewhat by the trouble with workmen wanting more pay.

A report from Bayfield, Wis., says that an effort will be made this year to have the Redcliffe Indian reservation thrown open to entry. These lands are rich in choice brownstone.

At Pipestone, Minn., the other day a workman found in a piece of stone a perfect representation of a man's foot, leg and part of the body. It will probably be sent to the World's Fair.

A farmer living near Correction, Iowa, recently found a curious specimen of a composite stone, weighing about 400 pounds. It showed plainly that it was a product of the glacial epoch.

Work has been resumed at the Northern Granite Company's quarry near Sauk Rapids, Minn., with about thirty men.

A stone jail is to be built this year at Hamilton, Minn.

Fred Widell has been running his quarry at Mankato, Minn., all winter. He has nearly completed a heavy contract for stone at Superior, Wis.

CHIEF.

ANCHORING BOLTS IN STONE.

TO a paper read before the Washburn Mechanical Engineering Society of Worcester, Mass., by Mr. E. F. Miner, we are indebted for the following facts regarding the holding power of anchor bolts in stone:

The tests were made on a Fairbanks testing machine in the mechanical laboratory of the Worcester Polytechnic Institute, for the purpose of determining the strength of the fastening of a cast-iron journal plate to a stone column. The materials tested were babbit metal, lead and sulphur.

It was necessary that the bolts should not enter the stone over 6 inches, and that they should be capable of easy removal without injuring the stone. For the purpose of the test a tap bolt was prepared, $1\frac{3}{4}$ inches in diameter, 9 inches long, with a thread $6\frac{1}{2}$ inches long. The thread was V shape $\frac{1}{8}$ inch pitch, cut nearly sharp on top, and about $\frac{3}{16}$ inch wide at the root, thus leaving a wide space between threads to allow the setting to fill easily about the screw. In all the tests, with one exception, the bolt was set in stone 6 inches; in the test with lead pipe, $6\frac{1}{4}$ inches.

The stones were prepared in 10-inch cubes, faced on three adjacent sides, and were of dark red Brandford granite from Stony Creek, Conn. The holes in the stones were as nearly as possible two inches in diameter, $6\frac{1}{2}$ inches deep, and in three of the tests were tapered, so that at the bottom the diameter was $2\frac{1}{2}$ inches.

The loads were applied slowly, and measurements for extension made at each 500 pounds increment. At every additional 5,000 pounds the setting was allowed to remain five minutes with the load applied. Measurements for extension were taken by calipering the distance between the iron clamp straps.

TEST NO. 1—Babbit metal setting, an inferior grade of metal, quite hard and brittle. Up to 10,000 pounds there was an extension of $1\frac{3}{8}$ inch, due to the babbit metal and stone coming to a firm bearing. After remaining five minutes under the load of 10,000 pounds no change was apparent. Between 10,000 and 15,000 pounds there was no extension; but after the five-minute period at 15,000 pounds the bolt had drawn out inch. At 16,000 pounds the stone split. It had previously been used with a lead setting and had no doubt been weakened thereby.

TEST NO. 2—Lead setting, lead melted and poured in about the bolt. Hole in the stone tapered. Up to 2,500 pounds there was an extension of inch. From 2,500 to 5,000 pounds there was no change; but after standing five minutes under 5,000 pounds the bolt had drawn out $\frac{1}{4}$ inch.

Above 6,000 pounds and up to 13,000 pounds, at each additional load of 1,000 pounds there was an extension of $1\frac{1}{8}$ inch, after which measurements were not taken. At 13,000 pounds, power from the engine was applied and an attempt made to pull out the bolt; the tension ran up to 33,000 pounds, when the lead gave way rapidly and the load fell off.

TEST NO. 3—Lead pipe setting in a straight hole. The internal diameter of the pipe was $1\frac{1}{2}$ inches and the external two inches. The pipe was made to fit nicely in the stone, the last inch in length being driven. The bolt was then screwed into the pipe and made to cut its own way, thus forming a thread in the pipe $\frac{1}{8}$ inch deep and forcing the lead out into all the irregularities in the sides of the hole. Up to 4,000 pounds there was an extension of $\frac{1}{8}$ inch, but between that and 10,500 pounds there was no change. Between 10,500 and 13,000 pounds there was an extension of $1\frac{1}{8}$ inch. Above this latter point each additional load produced its proportional amount of extension. In applying the power from the engine the tension rose to 25,000 pounds, and then fell rapidly from that point.

TEST NO. 4—Sulphur setting, in tapered hole. Up to 10,000 pounds there was no perceptible change in the bolt or setting. Above this point the extension became a measurable quantity, but at a load of 29,000 pounds it had become only $\frac{3}{4}$ inch. Beyond this no measurements were taken. At a load of 31,125 pounds the stone split. It was thought that at this point the sulphur setting showed signs of movement, though it is difficult to say anything definite. The fragments of sulphur from the broken stone showed no signs of crushing.

TEST NO. 5—Sulphur setting in a straight hole. Up to 20,000 pounds there was no measureable movement in either bolt or setting; at the end of the five-minute period at 20,000 pounds there was an accumulated extension of $1\frac{1}{8}$ inch, but beyond this there was no further extension through the remainder of the experiment. As 29,000 pounds the pressure of one of the iron clamps cracked off a corner of the stone and the load dropped 1,000 pounds; otherwise nothing was affected; at a load of 31,515 pounds, one of the iron straps holding the stone broke and ended the experiment.

The tests with the sulphur were the most satisfactory in every way, and that was the material selected for use. In the experiments with lead and babbitt metal, there was a very perceptible movement under a slight load, or until the metal and stone had come to a firm bearing. This would seem to be due to the contraction of the metal on cooling. In both experiments with lead the failure was between the lead and the stone.

A MONSTER BLAST.

ONE of the most imposing blasts that has ever taken place in a quarry occurred on March 17, at a point about two miles north of Fort Lee ferry on the Hudson, where the lofty Palisades make an almost impenetrable barrier to the civilizing influences which have prevailed lower down the river.

The beauty of this blast was that, although two tons of dynamite were used, it was so skillfully planned that when the mine exploded by the electric spark the quarrymen stood within 300 feet of the spot without feeling the shock unpleasantly. People living on the summit of the Palisades, who had been warned to forsake their houses at the moment of the blast, did not even report a window glass broken.

The report of the 4,000 pounds of exploding dynamite was less noisy than that of the ordinary blasting operation familiar to the residents of the New York uptown district. All that was noted was a rumbling as of subterranean thunder, and then the big column of rock known as Washington's Head rose gracefully and in a solid mass and fell crumbling on the slopes, where its fragments now lie distributed in a confused wilderness of boulders.

The Palisades at the point described, which is almost directly opposite Fort Washington, are being quarried by the Carpenter Brothers, who own about eight hundred feet of the water front and have been at work quarrying out the abundant stone for about three years. They calculate that it will take about ten years longer to exhaust the possibilities of the quarry. No blast of the magnitude of this has ever before been attempted at the Carpenter quarry. Its force has thrown down enough rock to keep the three hundred workmen employed on the place busy all summer carting it to the crushers.

In the first place a tunnel was drilled near the base of the big rock, which towered up 350 feet above the heads of the miners. This tunnel was extended about thirty feet into the solid rock, and was made large enough for a man to crawl into. At that point the tunnel was made to change its course downward and obliquely for a distance of sixty feet. Then it was carried back again straight through the rock wall until a vertical seam or split in the formation occurred, which offered an admirable resting place for the destroying dynamite. This seam was followed down for a distance of some thirty feet or more and in a commodious chamber almost wholly modeled by nature the workmen prepared a nest for the powder. It took several days to carry the dangerous stuff thro u g

these tunnels and load it into the rock chamber. After it was all in position it had to be tamped in and covered up with earth and logs, so that there might be no waste of the force. After this, connections were made with an electric battery which was placed far above on the summit of the cliff. Everything being ready, Superintendent Banks went around among the residents of the cliff, as well as those living below and near the blast, warning them of what was to occur at eleven o'clock of the forenoon of the day appointed, advising them to leave their houses at that hour, in order to avoid the consequences of a possible miscarriage of his carefully laid plans. Most of the people got as far away as possible from the scene, but Mr. Banks and his workmen took up their position not more than three hundred feet from where the 4,000 pounds of dynamite were waiting the electric summons that should stir them into terrible activity. It seems like a foolhardy thing that the men should have remained so close to this sleeping volcano, but Superintendent Banks felt so sure of the absolute success of his calculations that he waited for the hour set for the show with unconcealed impatience. At precisely eleven o'clock he gave the signal to the man at the battery, who stood a mere speck on the verge of the precipice, 350 feet above the quarry. There was a moment of suspense, and then the ground trembled under their feet, and a dull, rumbling seemed to rise out of the very bowels of the earth. The big column of rock could be seen to sway a moment, and then rose up almost bodily, as if propelled by an engine working at its very foundations, and fell out toward the river's shore, breaking into many fragments in its career and filling the slope with rock deposit reckoned at 100,000 tons at least. The stone is known as trap rock. It is very hard and is often employed for street paving purposes. The blast was hardly felt at all in the surrounding country.—*N. Y. Sun.*

ELECTRIC POWER IN A QUARRY.

The Chicago & Bedford Stone Co. (Bedford, Ind.) started their quarry on Thursday, the 13th inst., with electricity as a motive power. This is, we believe, the first quarry in the world to use electricity exclusively for all its machinery. Derricks, channellers, traveller, and electric lights are all run from one generator. The new six-gang mill is run by an endless belt direct from the engine. The experiment is being watched with the greatest interest by all the other quarries here, and if successful, which it no doubt will be, the old style will be a thing of the past.

"Your magazine *STONE* has arrived and we can assure you that we are well pleased with it."—*Quinn Bros., Brooklyn, N. Y.*

GEOLOGY OF BUILDING STONES.

OF interesting sciences, there are none more so than Geology—the study of the earth. The material substances about us, the handwriting of Dame Nature, is by the power of human reasoning made to reveal the secrets of the past. With this mighty weapon, knowledge is well, armed in the constant conflict with tradition, superstition and falsehood.

But there is to be found in this great historical storehouse, one chapter that reaches its usefulness out to us in our everyday life, and adds an interest to what may at first seem to be things of the commonplace.

I will say “stones for building.” To the layman this conveys little more than the idea of a block of hard material that has proved a very useful thing with which to construct a habitation. To the architect it conveys a feeling of pleasure, a friend of great possibilities; while to the mason it is the staff, the rib of his existence. But to the geologist, the words are of significance—the rib of the world. Of these, which is the more exalted? Let us listen to the geologist. With pleasure, if he will drop the isms and asms of the technical.

Order is one of the first and best laws of nature. The geologists are orderly, or nothing. Thus they began a classification in the earliest stages of their investigation of the earth's rocks. In this first arrangement, such rocks as were supposed to have been original in their formation were called primitive: and such as were composed by the disintegration of others, were called secondary. In the primitive rocks there are never found the remains of organic substances, as shells or plants; from which fact we infer that they were formed prior to the existence of life in any form. On the other hand, the secondary class often contained fossils of all kinds, and portions of what must at one time been primitive rocks. But these early scientists were entirely too simple in their nomenclature for the modern schools. Since that time, the latter have been busily engaged in inventing new names, and championing them abroad after their invention.

For the use of the laymen, however, an easy classification of rocks is as follows: 1. Primary. 2. Transition or Intermediate. 3. Secondary, (a) Lower Secondary series. (b) Upper Secondary series. 4. Tertiary. 5. Basaltic and Volcanic. 6. Diluvic and Alluvial.

Before taking these up, I should not forget to mention what a rock is.

“Oh, everybody knows what a rock is.”

All right then, what is it?

“A rock is a—a—rock.”

I thought so, too. A rock is an aggregation of minerals, occupying a

definite position in the earth's structure. It could be one mineral as well as more than one, but as a matter of fact the pure mineral is never found.

The primary rocks are the ground work of the globe; they are the ribs of the world. They rise into lofty mountains, and are the floor beneath which we have never penetrated. One of the most notable of these rocks is granite; I might better say granites, for the number of kinds is legion. However, the differences are very small, indeed, being more in what are really impurities than anything else. The usual three minerals are found in them all, quartz, feldspar, and mica. Quartz is a white glassy substance that breaks in an irregular manner. You have often broken the smooth white pebble that so abounds wherever there is running water? Ten chances to one that pebble is quartz. It is the mica in granite that sparkles so. The bits are small sheets or leaves, very small indeed, but still abundant enough to give the greenish tint so often noticed. Large pieces of this same mica is called isinglass, and is certainly familiar.

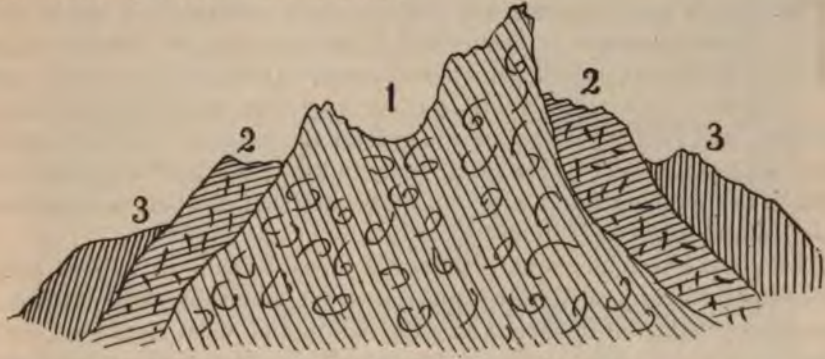
Other primary rocks are gneiss (pronounced like the word nice), mica-slate, clay-slate, primitive limestone, porphyry, and syenite. They are all, as a rule, crystalline in their structure, and never contain remains of organized substances or portions of other stones. By organized substances, we mean living things, as plants and animals.

Gneiss and mica-slate are composed of the same materials or minerals as the granites, only arranged somewhat differently. The grains are, as a rule, very much smaller than in the granite. In gneiss, the quartz and feldspar are very closely aggregated while the mica is arranged in scales between strata of the same. Hence it is that gneiss is really a stratified rock, and if a section or break be made at right angles to the strata, it will present a striped appearance, for the quartz and the feldspar are nearly white and the mica a narrow band of green. Often the mica is a deep black.

Mica-slate is composed principally of quartz and mica, and a very small portion of feldspar. The latter is sometimes all but absent. The quartz is commonly in the form of fine sand, and the mica in flakes. The latter predominates, and sometimes seems to be the entire composition of the rock. Mica-slate differs from gneiss in having such a small portion of feldspar; and more in the positive stratification which is so marked, that it is easily separated by wedges into plates or layers. An example of the latter quality is found in the common flagstone.

These three stones, granite, gneiss, and mica-slate, form what is known as the granite group, and together they form the major portion of the earth's crust. The gneiss is intermediate between granite and mica-slate in its structure, and is often found between these rocks, lying over the former and under the latter. Sometimes the transition is so gradual as to

be hardly perceptible, the granite growing to a stratified gneiss, and the latter as slowly into fissile mica-slate.



The drawing represents the position of the earth that the granitic rocks generally assume in relation to each other. The center of a mass is granite (1) which appears on the surface at altitudes. The next highest planes are gneiss (2) and have been placed so by the same great force that has rifted and raised the granite. The mica-slate (3) rests against the gneiss, and it is not hard to see that these were once parts of the same horizontal layers which have been disarranged by some great force pressing from below.

Edward C. Weaver.

HARVEST.

When; under folds of snow, the wheat-shoots brood
 As prisoners on the broad fields of the West,
 Waiting their freedom at the Spring's behest,
 What fears and hopes to their dark cells intrude?
 Some piteous cry may pierce their solitude
 From a child starving at its mother's breast;
 A helpless nation's prayer to God addressed;
 The shouts of gamblers wagering man's food!

Then Winter's vigor makes the young shafts bold;
 Spring quickens, and the Summer's fierce suns shed
 Their molten fire, that turns the green to gold
 And yields ripe acres to be harvested.
 This is the gift of God; who dares withhold
 From empty mouths His life-bestowing bread?

—Meredith Nicholson, in New England Magazine.

BELT STRENGTH NEEDED.

THERE is no arrangement of pulleys which will enable a belt to drive a certain quantity of machinery, if the pull that the belt has to give to the driven pulley, which is the same thing as that which it has to take from the driving pulley, is greater than the belt and its fastening will stand. Of course the greater the arc of contact the less the strain on the belt, no trouble about that; but with all that there must be a strain on the belt; and that must not be greater than the belt and its fastening will stand safely year in and year out.

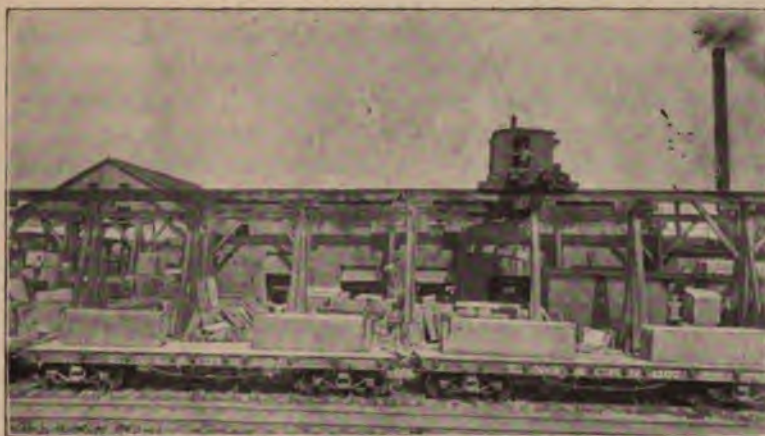
If we know how many square inches of cross section of rubber belt it will require to carry a certain horse power at a certain speed, we can to some extent make our choice as to what width and what thickness are required to give that cross section. The main thing is to find out what cross section is needed to do the work with certainty and safety. Taking 180° arc of contact as the standard, the number of square inches of cross section of rubber belt required is equal to 2.233 times the horse power, divided by the velocity in feet per second; or to 133.98 times the horse power, divided by the velocity in feet per minute. If there is not so much contact in degrees, there will not be so much drive, or there will be needed more belt. The faster the belt runs the less cross section it need have to carry a given horse power or the more power it will carry with a given speed.

The following table gives the cross section required for various speeds to carry various horse powers. For other powers it is of course exactly proportionate:

CROSS SECTION OF RUBBER BELT NEEDED.

H. P.	Belt Speed, Feet Per Minute.			
	1,000	1,250	1,500	1,750
5.....	.6699	.5359	.4466	.3828
10.....	1.3398	1.0718	.8932	.7656
15.....	2.0097	1.6078	1.3398	1.1484
20.....	2.6796	2.1437	1.7864	1.5312
25.....	3.3495	2.6796	2.233	1.914
30.....	4.0194	3.2154	2.6796	2.2968
35.....	4.6893	3.7513	4.1262	2.6796
40.....	5.3592	4.2874	3.5728	2.0624
45.....	6.0291	4.8232	4.0194	3.4452
50.....	6.699	5.3590	4.466	33.828
55.....	7.3689	5.8949	4.9126	4.2108
60.....	8.0388	6.4308	5.3592	4.5936
65.....	8.7087	6.9570	5.8058	4.9764
70.....	9.3786	7.5029	6.2524	5.3592
75.....	10.0485	8.0383	6.6990	5.7420
80.....	10.7184	8.5745	7.1456	6.1248
85.....	11.3883	9.1106	7.5922	6.5076
90.....	12.0582	9.6465	8.0388	6.8904
95.....	12.7281	10.1825	8.4854	7.2732
100.....	13.398	10.7184	8.932	7.656

Robert Grimshaw.



PROSPEROUS STONE-WORKERS.

ONE of the busiest establishments in the oölitic district is the mill of the Bedford Steam Stone Works at Bedford, Ind. This concern was organized first as a partnership in fall of 1886, by W. C. Winstandley, T. V. Thornton, D. Y. Johnson, and E. B. Thornton. The business grew rapidly, and in spring of 1888, the present company was incorporated under general mining laws of state of Indiana, the officers at that time being W. C. Winstandley, president, and E. B. Thornton, secretary and treasurer, with D. Y. Johnson, manager.

At the time of its organization, the company owned a four-gang mill, steam traveler, and seventeen acres of stone land which produced the very best grade of both buff and blue oölitic stone, and the early use of it in some of the finest buildings in the West had much to do with popularizing the stone from this section. In the spring of 1891, Mr. W. C. Winstandley and Mr. T. V. Thornton sold their interests, and the present board of directors consists of D. Y. Johnson, president and general manager; E. B. Thornton, secretary and treasurer, and Jos. F. Thornton.

The mill plant situated at the junction of the Monon and the Evansville & Richmond railroads has gradually been increased and now consists of power drills, lathe, and seven large patent gangs, automatically fed, in part by Hawley sand feed and the remainder by Frenier & Leblanc's. The past year, 1892, a switch from the Evansville & Richmond railroad was constructed to their works and under their traveler, so that now they are not at the mercy of one railroad but have shipping facilities not enjoyed by any other like establishment in Bedford. Their business the past year increased thirty-three per cent., compelling them to start their mill on January 15, and run constantly day and night till December 31, at which time they still had

orders in their books unfilled. In connection with their mill, they have a large cutting shed, with overhead traveler in same, and out of this shed have gone some of the finest work ever wrought in Indiana stone.

The market for their product extends from Boston to Denver, from the Lakes to the Gulf—in fact they have furnished stone for three court houses in the state of Texas alone. Among a few of the most prominent buildings they have furnished, are the palatial residences of Hon. Clem Studebaker, South Bend, Ind.; Col. H. Hecker, Detroit, Mich.; John Laughlin, Sidney, O., and Col. W. S. Barns, Lexington, Ky.

The work turned out by this company has always been highly satisfactory, as is attested by their long list of old customers who have dealt with them continually since starting. They have frequently received from their customers such testimonials as the following:

OFFICE OF GAZETTE-TRIBUNE,
KOKOMO, IND., August 14, 1892.

To Bedford Steam Stone Works, Bedford, Ind.

GENTLEMEN—Stone for our new building received. We are highly pleased with it and would cheerfully recommend you to any others needing Bedford stone.

Very respectfully, KAUTZ & MCMONIGAL, Proprietors.

An explanation of the success achieved by this concern, is found on slight acquaintance with its management which is in the hands of hustling, wide-awake young men, who through aggressive work and untiring energy have placed the Bedford Steam Stone Works in the front rank of similar establishments.

SLATE PRODUCTION FOR 1892.

THE *American Slate Trade Journal* prints the following as an annual report of the slate trade for the year 1892.

REGIONS.	Number of Quarries.	Production of Roofing Slate in Squares.	Total Value of Roofing Slate.	Total Value of other Manufactured Slate.	Total Value of Entire Product.
Bangor Region, including the Pen. Argyll and Hard Vein Sections.....	60	360,000	\$1,080,000	\$200,000	\$1,280,000
Lehigh Region, including the Walnutport and Danielsville Sections....	47	155,000	550,000	225,000	775,000
Vermont and New York Region, comprising Rutland county, Vermont, and Washington county, N. Y.....	77	310,000	900,000	300,000	1,200,000
Peach Bottom Region.....	10	28,600	138,000	4,000	142,000
Maine.....	5	46,000	234,000	6,000	240,000
Virginia.....	4	24,400	93,600	2,400	9,600
Totals.....	203	924,000	\$2,995,600	\$737,400	\$3,631,000

The year just closed has been one of satisfaction and profit to the slate operators in general. In the Vermont and New York region the output of

Sea Green slate has been large and trade exceedingly good, much better even than during the previous year, when the quarries were operated to their utmost capacity and the entire product readily marketed. The shipments of this slate are principally to the West, and it is used where its cheaper price atones for its poor color. The shipments by the Vermont Slate Company, which controls the Sea Green product, were 225,000 squares, and show a material increase over 1891. The company enters the sixth year of its existence under very propitious conditions, all knotty points coming before the annual meeting in December having been thoroughly and amicably discussed and remedied in a business-like manner. No changes were made in the prices, the old schedule remaining in force until April 1st, 1893. The unfading green and purple maintained their position and price as fancy slate. The red still command their high price, but even at that figure, on account of the smallness of the beds and difficulty in quarrying, are scarce. The manufactured slate dealers in the Vermont region have been somewhat hampered by competition and lack of organization, and in consequence have not operated their plants to their full capacity. The Black Maine slate still ranks among the fancy articles and commands prices accordingly. It is finding some sale in the West, but is principally used in the New England states.

In Pennsylvania all branches of the trade report prosperous times, except school slate manufacturers, among whom business is a little dull and prices rather low. In the Bangor region all quarries turned out an increased product during 1892, yet have fewer slate on the bank than for years past. In Pen Argyl there is a very light stock on hand, and thorough and harmonious organization would command good prices for the spring trade. In the Lehigh region the outlook is good, and prices fairly firm. The manufactured slate dealers in the Bangor and Lehigh regions have had a good year, and the prospects for a lively spring trade are exceedingly flattering. In the Peach bottom and Virginia regions the year just closed has been satisfactory and profitable, and the manufacturers express confidence in the present season. The reports from the West are unusually good for this season of the year, showing a demand on many sizes exceeding the supply. The business is steadily extending to new districts, thus increasing the demand, and keeping trade healthy. There is, however, still ample room for new markets, and it is confidently expected that the present season will witness the introduction of slate in many new localities and a corresponding increase in the output and sales.

THE TELAUTOGRAPH.

THE transmission of articulate speech over considerable distances by means of mechanical vibrations of a string or wire set in motion by a diaphragm in unison with the sound vibrations, and reproduced by means of another diaphragm set in motion at the other end by these mechanical vibrations of the string, was known to the Chinese, it is believed, before the Christian era.

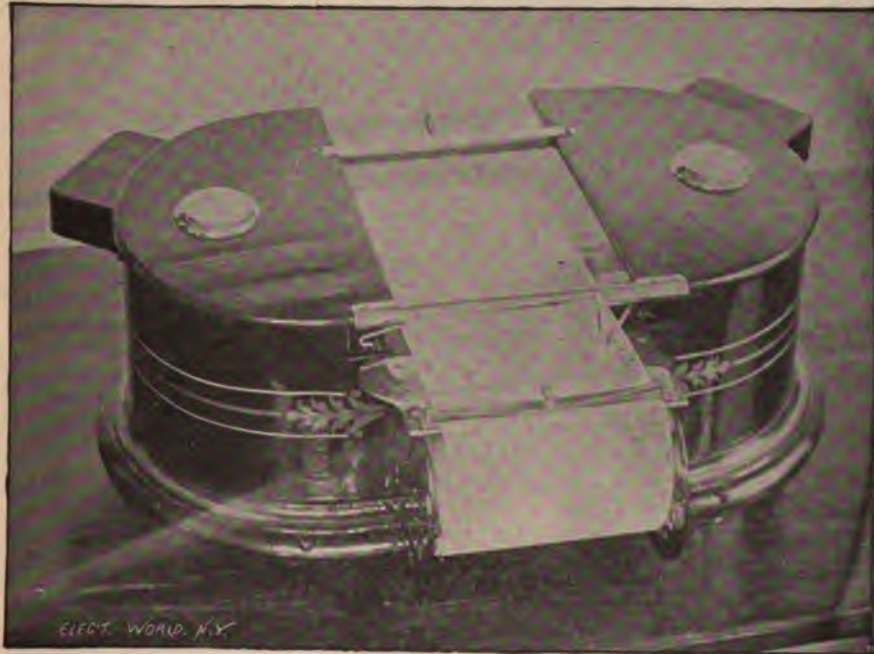
The transmission of speech over even greater distances by means of electrical vibrations set up in a conductor by sound vibrations transmitted through a diaphragm and reproduced as such at the further end by a similar diaphragm set in action by means of these electrical vibrations is a discovery of the last decade, and what changes has it wrought! The fac-simile reproduction of written characters at a distance by a receiving pen or stylus mechanically connected with the transmitting pen has long been known in the arts, and has reached its greatest perfection in the familiar pantograph now so largely used in the daily routine of the artist, the architect, and the engineer. The distance through which the apparant large and complex movement of autographic inscriptions can thus be transmitted mechanically is exceedingly limited, however, and the pantograph and other similar instruments have found their use in fac-simile reproductions to a scale, near at hand, rather than in transcending space.

The telephone had no sooner become an accomplished fact than the question arose, "If the vibrations to which music and speech are due can be reproduced electrically in defiance of distance, may we not so connect our inscribing pen electrically with a similar one at similar distances as to cause the latter to reproduce with fidelity and simultaneously the motions intelligently directed at the near end?"

At the first blush the rapidly changing irregular curves of script and sketches, amenable to no law or equation, but subject only to the whim or vagaries of their author, would seem to require for their reproduction an intelligence and motive in exact consonance with those that gave them birth. It would seem to involve a complexity of mechanism little if any short of human intelligence, and marvelous as was the electrical transmission of speech, still more marvelous and impossible of accomplishment did the faithful transmission of autographic work appear to the lay mind.

To the engineer or mathematician, however, the problem was much simpler, for the law that all forces or motions in a single plane, however

complex, could be resolved into two rectilinear motions or lines at an angle to each other, and that these if recomposed would give as a resultant an exact fac-simile of that which gave them origin, was known. The transmission of rectilinear motions in speed and extent corresponding in every particular with their originals was in theory an operation of great simplicity, but the matter of detail was one which required great care and patience to determine. The law of the parallelogram of forces afforded a ready means both of resolving these curves into their rectilinear components at the



The Telaarograph Receiver.

transmitting end and determining their instantaneous resultants at the receiving end.

If a transcribing pen be placed at the focus of two cords at an angle of 90 degrees or other large angle, each passing over a drum or pulley of its own and kept in tension by means of a weight attached to its other end the motions of these weights as the pen moves will represent in speed and extent the rectangular components of the motion described.

The problem now became how to reproduce the component motions in exact fac-simile at the other end, and to recompose their instantaneous values by the parallelogram of forces at that end. This was the problem which Prof. Elisha Gray set for himself and the practical solution of which

was given ocular demonstration before the press of New York and Chicago on Tuesday, March 21, at the respective offices of the Gray National Telautograph Company, at 80 Broadway, New York, and in the Home Insurance Building in Chicago.

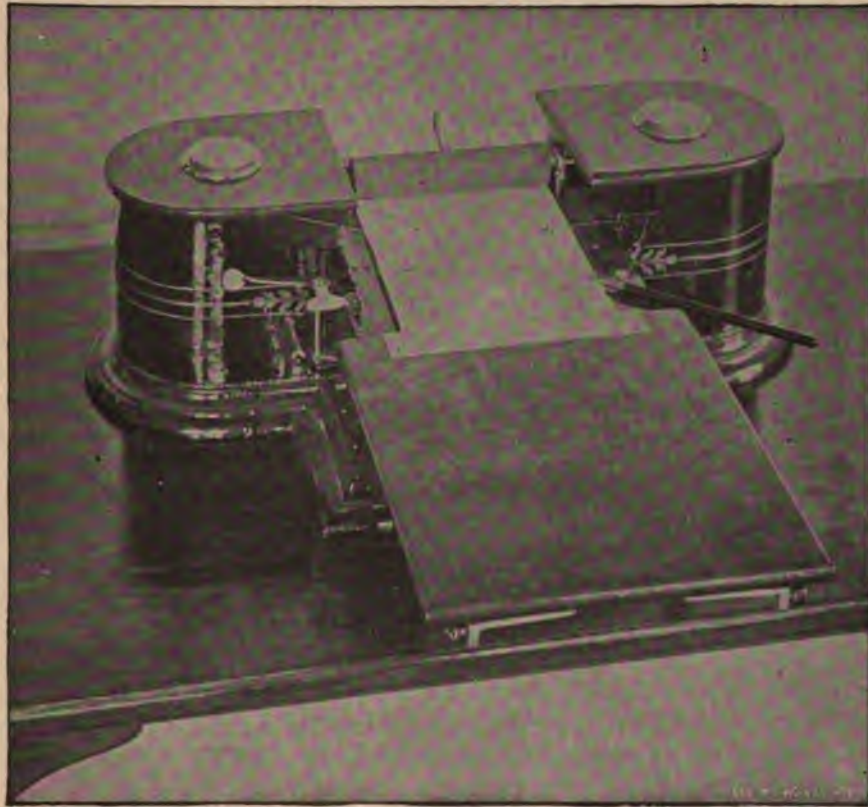
Accompanying this sketch is a diagram giving both the transmitting and receiving mechanisms, represented for convenience of description, side by side. There are also given photographs of the commercial instruments as now ready for the market, and a copy of the original of some autographic work and its reproduction through an artificial resistance corresponding to about a mile of wire.

It may be well to premise that since two motions, each independent of the other, are to be reproduced, two electrical circuits are involved in the transmission. And since it is a well-known fact that pulsations of successively opposite polarity can be sent over a line wire with greater rapidity and certainty of effect than pulsations of successively like polarity, alternating currents are employed in both these circuits. Since the mechanism in both of these lines is identical a description of one will answer for both; it being understood that wherever the singular is used a duplicate is implied.

In Prof. Gray's original patent, filed June 13, 1888, and issued July 31, of the same year, the following claim will be largely self-explanatory. Claim 11 reads "The combination with two main circuits, each including a pole changer, an interrupter, receiving magnet, and a polarized relay, arranged to direct the current through one or the other of the magnets, according to its polarity, of a transmitting pen connected to operate said interrupters by its movements in two directions crosswise of each other, two local circuits, each including the magnet of one of the pole changers, and circuit maker and breaker, which is also connected to and operated by the pen, to change the condition of its local circuit, and thereby change the polarity of the current over the corresponding main circuit when the movement of the pen in either direction is reversed and a receiving pen moved in two directions crosswise of each other through the action of the magnet of the respective circuits and in opposite directions through the action of the respective magnets of each circuit substantially as set forth."

In the completed machine he has arranged a series of contacts over which there wipes a brush so that the number of pulsations in that circuit is determined by the distance which the pen is moved in that component direction, and the speed of succession of the pulsations varies with the rapidity of movement in that component direction of the transmitting pen. Referring to the diagram, A represents the pen or pencil of the transmitting instrument attached by flexible cords at right angles to each other to two drums concentric with the sunflower contact B and C. Rigidly

attached to these drums are brushes which as the drums are revolved sweep over the contacts in the direction of revolution. Also attached to each drum is a lever arm which makes contact either with a front or rear stop, as the direction of revolution is forward or backward, thus changing the direction of motion at the receiving instrument simultaneously with that of the transmitting pen, as will be further described. The alternating



The Telautograph Transmitter.

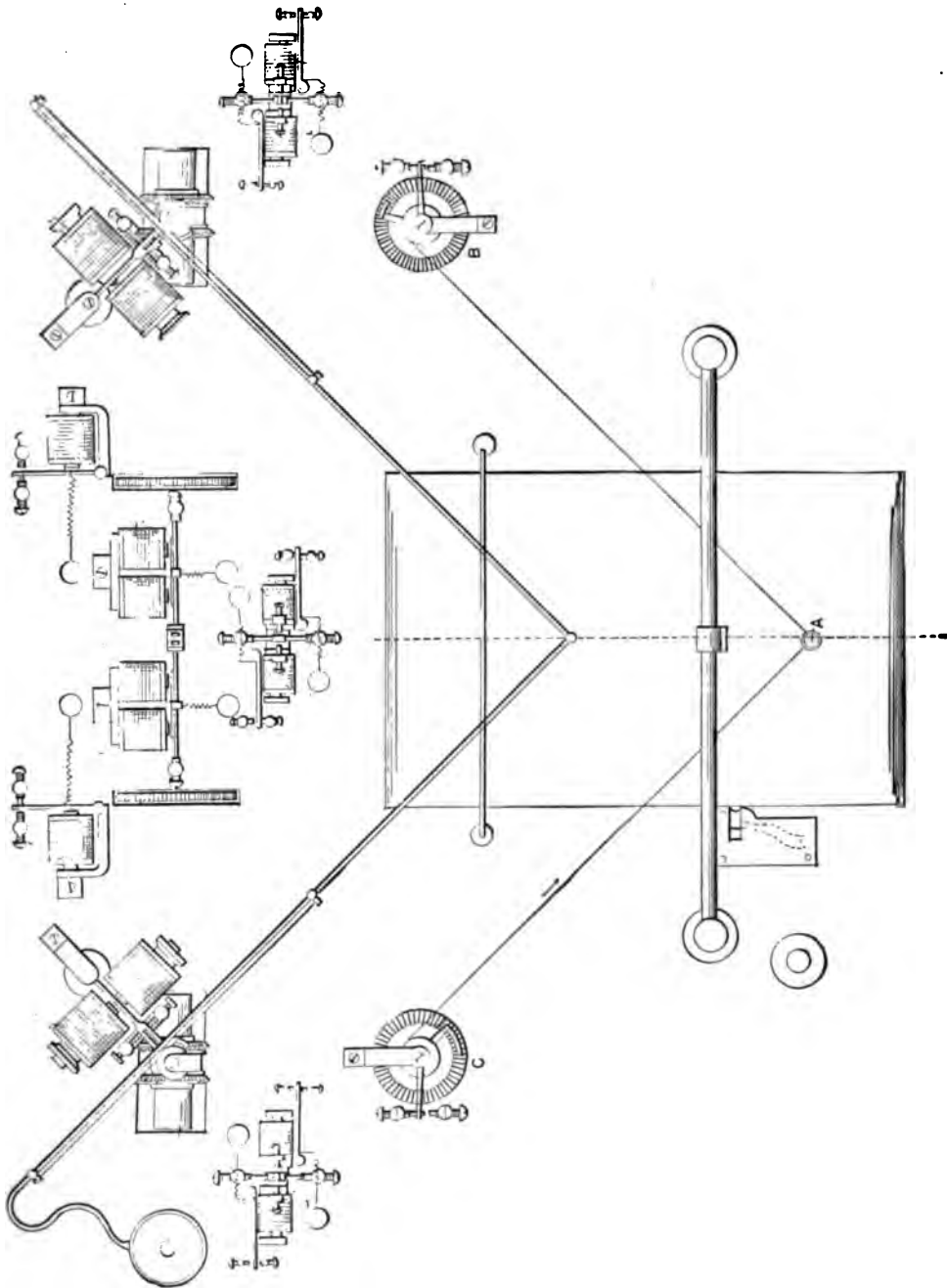
current for each circuit is supplied by two batteries, one at either end, so connected as to oppose each other. The battery at the transmitting instrument is usually made of about twice the strength of the other, and the connections to the sunflower as the brush sweeps around is such that at successive contacts first both batteries are in action and then but one; the result being that when both are in circuit the transmitting battery overpowers the receiving battery with its excess of voltage and gives a current in one direction, whereas when but one is in circuit an equal impulse in the

opposite direction is obtained and an alternating current is thus produced, the number of whose pulsations is determined by the angular movement of the brush and the speed of succession by the rapidity of this angular movement.

Since the movement of the pen A is resolved into its rectangular components by means of the two cords which wind upon and unwind from the drums, the same are reproduced in units of electrical pulsations by the angular motion of the brush on the sunflower. In the receiving instrument two drums also are provided which actuate the stylus by two drums at an angle to each other similar to that of the cords in the transmitting instrument. The mechanism provided for the driving of these drums consists of a set of magnet weights, one set for each of the two crosswise directions of motion of the transmitting pen. Each of these sets consists of two magnet clutch weights, each weight being suspended from a disc mounted upon the prime motor shaft and arranged to be clutched to that shaft at proper intervals to raise the weight by power furnished from an independent source.

Each of these magnet clutch weights is also connected to the drum from which the receiving pen is driven, through the agency of the magnetic clutch, in such a manner that they alternately act upon the said drum to drive it in alternately opposite directions. An escapement attachment is also provided so that as each impulse is received the escapement permits the revolution of the drum by the weight through a distance equivalent to one-half a tooth. This being the unit of movement in the receiving instrument, the extent of movement in each rectangular component will be measured by the number of impulses received over the line and the rapidity of that movement by the rapidity with which these impulses are received. Thus we have the rectangular components of the transmitting pen reproduced both in extent and rapidity at the further end, and combining these two to the receiving stylus by pivoted arms the former is compelled to follow the resultant of these instantaneous values and the fac simile reproduction results.

The paper is fed to the transmitting instrument from a roll, which is moved by the sender as the length of the message requires. The course of this paper leads over a metallic plate, some two and one-half inches wide and about four inches long. An area of this extent can be written upon without motion of the paper. The plate itself forms an excellent writing surface upon which to place the paper for transcribing the message, but it has a more important office to fill, as it forms a connecting link between the two sets of batteries which supply the transmitting currents. Normally these are broken, and the receiving pen is held from contact with the paper at the further end by a spring actuated lever arm. The slightest pressure



of the transmitting pen, however, upon the paper above the metallic plate is sufficient to close the circuit and to bring the receiving pen in contact with the paper at that end in readiness to reproduce the characters transmitted; thus, whenever the transmitting pen is lifted from the paper, as at the end of a word, or the end of a sentence, or to cross a t or to dot an i, the receiving pen is also lifted synchronously, and no mark is made at the receiving end until the transmitting pen is again in contact with the paper. The directive currents, however, are continued, and any motions made by the transmitting pen while out of contact with the paper will be reproduced at the receiving end in the air by the receiving pen. In this way, a new line is commenced at the proper interval and the dot for the i, the cross for the t, or the punctuation marks, fall into their proper place at the further end.

When the area of the metallic plate, or as much of it as is desired, has been filled by the sender, and additional space is required, the movement of a lever on the transmitting instrument advances the paper the proper distance, in a manner similar to that employed in our typewriting machines; the movement of this lever produces a simultaneous movement of the paper on the receiving instrument, so that the spacing of the lines and the length of the message received correspond exactly with the message transmitted. Since the transmitting pen plays no part but a directive one, anything may be used for this purpose—one's lead pencil, a stylographic pen,

Specimen of
work done on the Gray
TELAUTOGRAPH.

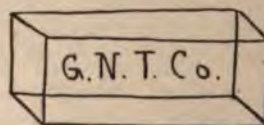
up hill
down hill

1	2	3	4
5	6	7	
1801			

abround

He can^{not} pay you today.

Here
are
a
few
lines
without



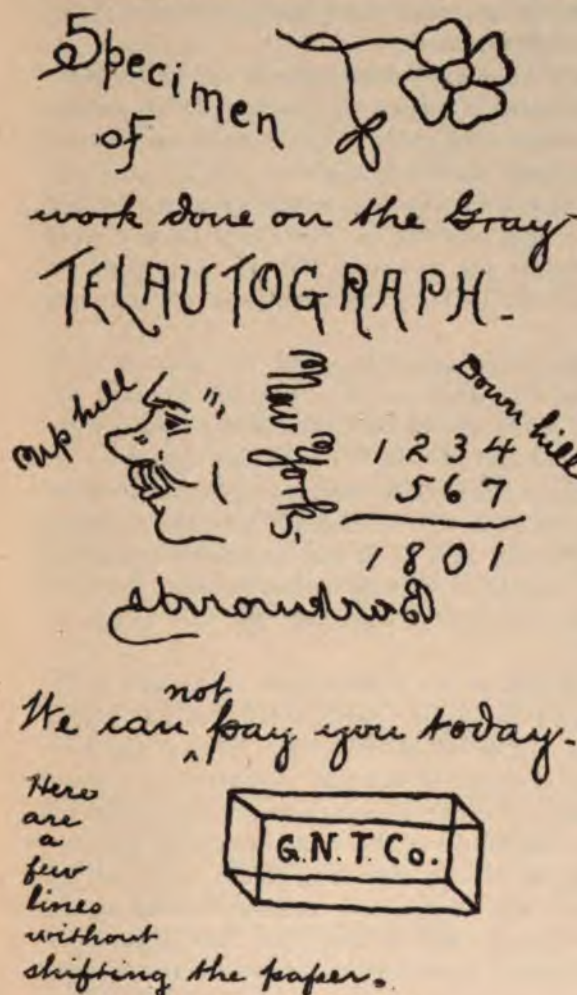
shifting the papers.

A Telautogram as Written.

or even a toothpick, will be equally effective. The chief essential in the receiving pen is that it shall be capable of registering the rapidly changing curves with certainty and with as little friction as possible. A pen somewhat similar to that employed in Lord Kelvin's siphon recording instrument is therefore used, which consists of a glass tube drawn out at its end to capillary proportions, and this filled with an easily flowing ink.

While some of the details are too complicated to permit of description within the limits of this article, enough has been said to give a clear idea of the fundamental principles employed in this instrument. It will be seen at once that complicated as the problem at first seems, its solution has been obtained through exceedingly simple means, the complication referred to being more apparent than real.

The instrument itself is intended as an instrument for the people, and in this sense is as simple as the telephone itself, and may be successfully operated as readily by a child who can



A Telautogram as Received

do nothing more ambitious than to execute an awkward scrawl as by the most experienced and erudite electrician of the land.

It is intended in its introduction to follow out closely the line so successful in the telephone exchange business; in fact, it is intended that subscribers shall be connected to one another through central exchanges and switchboards in exactly similar manner. It will have one advantage in this connection over the telephone exchange, in that in the latter the

operator, if he chooses, may become conversant with the messages transmitted, but in the former there will be no possibility of such leakage, and the message will be as inviolate from profane eyes as if written at home and transmitted in secrecy through the mails.

To call a subscriber, the operation is exceedingly simple: A in his office merely writes on the paper, "A wants B," when the operator at the central station makes the proper connection, and the line is then open for the most sacred secrets of the two subscribers, and to them alone.

As to speed of transmission, that is limited only by the speed with which the subscriber is able to write. It is possible for some to write at a speed of from thirty to thirty-five words per minute. The average speed for telegraphic communications is said to be about twenty-six and one-half words per minute.

The current employed in the telautograph is about the same as that employed in the telegraph, and the distances it is possible to reach are about the same as those which can be reached with the Morse signals without the intervention of relays, and may be said to be about 500 miles.

While the relay has not yet been adapted to telautograph transmission, it would seem to be readily adaptable to this service, and if so, the time may not be far distant when the banker in New York may attach his autograph to a check in San Francisco as readily as he now communicates with his broker through the intervention of the Morse code and the telegraph operator.

As before indicated, the exhibition of the telautograph was given to the press of New York and Chicago, there having been some seventy or eighty invitations issued by Prof. Gray. The full attendance on hand at the New York offices showed the interest evinced in the new invention, and many were the expressions of surprise and admiration of the workings of this the latest invention brought before the public in this most wonderful era.

At the offices of the company, at No. 80 Broadway, there were on this occasion exhibited four distinct sets of the instruments connecting the various rooms through a switchboard apart by itself, and thus all the operations of a central exchange business were duplicated before the eyes of the invited guests. In addition to these there were two sets of instruments each consisting of a transmitter and receiver placed side by side, so that the observer might witness with one glance of the eye both the sending and receiving of the message.

Through the actual lengths of the line over which messages were transmitted at this exhibition were necessarily short, artificial resistances were introduced to make them equivalent to a separation of about one mile.

One of our cuts represents a message as written, and another the same as it was received. This shows most clearly the elasticity of the system and

the fidelity of reproduction, for in this it will be seen that not only printing and script, which in the original were transcribed horizontally, uphill, downhill, and backward, but sketches were equally well reproduced, at the further end.

Now that we can recognize the voices of our friends and communicate with them in autograph over miles of wire, there would seem to be but one step left for the future, by which space may be totally annihilated; namely, that we may also see our friends as they speak and write. What genius will enable us to do this?—*Electrical World*.

STRENGTH OF CONCRETE.

THE paper which was read before the Society of Architects, London, by Mr. H. W. Chubb referred to the use of concrete as a material in building fireproof structures. The specimens of concrete which Mr. Chubb mentioned as having been tested by Mr. J. J. Webster, M.I.C.E., had been specially prepared. The following table shows their composition, together with the results which were obtained:

Nature and Proportions of Materials in Concrete Briquettes.	Average weight per cubic foot.	Breaking weight per square inch at 60 deg. F.	Breaking weight per square inch after being heated and quenched.	Average loss per cent of original strength after heating and quenching.
	lbs.	lbs.	lbs.	per cent.
Neat Portland cement.....	124.6	554.6	117.2	60.8
1 part cement, 1 part sand.....	120.9	448.0	93.0	80.0
1 part cement, 3 parts sand.....	111.2	100.8	18.7	81.4
1 part cement, 5 parts sand.....	109.7	74.6	15.0	79.8
1 part cement, 4 parts iron furnace slag.....	163.08	108.1	23.06	69.3
1 part cement, 1 part pumice stone.....	64.8	94.58	38.3	59.6
1 part cement, 4 parts broken fire-brick.....	95.04	84.4	30.5	50.9
1 part cement, 4 parts coke breeze.....	71.65	69.9	39.06	57.1
1 part plaster-of-Paris, 4 parts broken fire-brick.....	89.6	66.8	10.3	75.0
1 part plaster-of-Paris, 4 parts pumice stone.....	55.6	57.4	3.4	94.7
1 part plaster-of-Paris, 2 parts furnace slag.....	148.0	223.3	6.9	96.8
1 part plaster-of-Paris, 2 parts broken fire-brick.....	106.9	167.5	15.7	90.0

GUARANTY OR SURETYSHIP.

A GUARANTY is a promise to perform an agreement or answer for debts, default or misdoings of another, who is himself liable, if he fails to keep his promise. Where A agrees to pay B money or to do something else for him, and C agrees with B to do it, if A does not, C's agreement is a guaranty. C is called a guarantor or surety, B is the guarantee, and A is the principal.

A guaranty differs from a warranty. The warranty relates to property, its title, quality, etc., while a guaranty relates to the act or undertaking of a person. It is not negotiable or capable of passing to any person but the guarantee, unless the terms of the guaranty provide for it. No special consideration is needed to support a guaranty, when it is made at the time or prior to the execution of the principal agreement or completion of the principal transaction, but if made subsequently, there must be a new and valuable consideration passing to the surety to make his promise valid.

A guaranty must be in writing and signed by the guarantor or his authorized agent, but the agent's authority to sign need not be in writing.

FORMS OF GUARANTY.

Guaranty Indorsed on a Note.—For value received, I guarantee the due payment of the within note.

(Date.)

(Signature.)

Guaranty of a Note on Separate Paper.—For value received, I guarantee the due payment of a promisory note, date——day of——whereby (name of maker) promises to pay to (name of payee)——dollars, on or before——months from the date thereof.

(Date.)

(Signature.)

LETTERS OF GUARANTY.

Sir:—If you will send to Mr.——(the goods he wishes to buy, or the goods described) to the amount of——dollars I, for value received, hereby promise and guarantee that the price thereof shall be duly paid.

(Date.)

(Signature.)

This letter should state any particular terms or considerations of sale, or credit, or delivery, intended by the parties.

If the guaranty is made after the principal debt was contracted, it is not good unless there is a new and valuable consideration. This consideration may come from any party besides the one receiving the guaranty. Any

benefit to him by whom the guaranty is given or any loss or inconvenience to him who receives, is a good consideration. It is unnecessary that the benefit should go to the guarantor in order to be good.

A guaranty of blank note is binding.

ACCEPTANCE OF A GUARANTY.

A guarantor is not bound unless the guaranty is accepted by the party to whom it is made and notice of acceptance given; but when the guaranty is absolute, direct and unconditional the notice is unnecessary unless it be expressly or by implication required by the offer to guaranty. Where the offer to guaranty is absolute an unconditional acceptance is presumed.

Notice of acceptance is required in case of an offer to guaranty a future agreement or transaction, also where the offer to guaranty is general and addressed to no particular person.

THE DISCHARGE OF THE GUARANTY.

Entire good faith is required between the debtor, creditor and surety.

THE GUARANTY IS DISCHARGED.

(1.) If the liability of the principal debtor or party be materially changed by the creditor without the consent of the surety. A very trifling variance will make the guaranty void, if it be appreciable in business. A guaranty of drafts to be drawn at sixty days sight will not cover a draft at ninety days sight. (2.) If the debt or liability be renewed or extended, unless provided for in the guaranty.

The guarantor is discharged by the omission of the creditor to do anything or perform any condition imposed upon him by the guaranty, or by any fraud, misrepresentation or concealment by the creditor or with his knowledge.

A guaranty of a partnership debt is discharged by a change in the membership of the firm, although there be no change in the name or business.

Indulgence of a debtor with the surety's knowledge works no discharge.

(3.) If the guarantor requests the creditor to sue the debtor and he fails to do it within a reasonable time and the debtor in the meantime becomes insolvent, the guaranty is discharged. (4.) A binding agreement of the creditor to give further time for payment also discharges the surety.

Where a guaranty is given for the price of a thing and the buyer bargains with the seller to pay him more than the price, the excess to go toward the payment of an old debt, the guaranty is void entirely because of the fraud.

REVOCATION OF GUARANTY.

A guaranty of a specific agreement or undertaking cannot be revoked, but a general guaranty to be responsible for the acts of another in any line, can be revoked at any time, unless the guaranty forbids it. If the principal

debtor fails to pay, and the guarantor is looked to for payment, he should be notified of the fact at once so he can, if possible, secure himself. If the notice, however, had done the guarantor no good, he is not discharged by a failure to give it.

DISTINCTION BETWEEN A GUARANTY AND AN ORIGINAL CONTRACT.

A promise to pay a debt or fulfill a contract which an infant or other person incapable of making contracts may make, is an original debt, and the creditor may proceed directly to collect of the guarantor.

Also where A says to B "Let C have such goods as he may order and I will pay you, or charge them to me," A would be liable and B would not. But if A said "Let C have such goods as he may order and I will see you paid," or "I will guarantee the payment," C is still liable and A is liable only as guarantor—his agreement being a collateral one.

So it is often a difficult question of fact, whether from the intention of the parties, a person binds himself alone to pay for goods delivered to another or whether both he and the person receiving the goods are bound. It depends altogether upon the intention of the parties and that intention is to be gathered from the writing, language or acts of the parties and the circumstances surrounding the transaction. If the person receiving the goods is not made liable by the transaction, but the other party is alone liable, the promise need not be in writing for it is a direct, original promise to pay. But on the other hand, if both the receiver of the goods and the third party are liable, the promise of the third party is collateral and must be in writing and signed, to be binding on him.

LIABILITY OF THE GUARANTOR.

He is to be charged no further than his agreement, plainly interpreted, extends; whether he has suffered injury from a departure from the terms of the guaranty cuts no figure in the case whatever. He cannot be made liable for the slightest obligation not fairly intended by his agreement.

A guaranty of a note to be made payable at a particular bank, will not cover one payable generally or at another bank.

No change can be made even though it diminish the guarantor's risk of loss. A guaranty of credit given until January 1, 1840, was held not to cover one given until December 25, 1839.

The surety is at liberty at any time after a debt is due to pay it and obtain from the creditor any securities he may and then hold the debtor liable or proceed against him at once.

If there be more than one surety and one of them pays the debt or a portion of it greater than his share he has a right to make the others pay their pro rata share.

V. H. Lockwood

STONE PRODUCTION—VIII*

MINNESOTA.

The advances made by this state in the stone industry since 1880 are very remarkable. According to the census of 1880 the total number of quarries in Minnesota was forty-one for all kinds of stone, and the total value of the product in that year was \$255,818. In 1889 there were 102 quarries producing limestone, granite, and sandstone. The total value of the product of all kinds of stone in that year was \$1,102,008.

Granite.—The value of the granite produced in 1889 was \$356,782. The product came from twenty-three quarries scattered over the following counties: Stearns, \$139,265, Benton, \$110,650, Bigstone, \$95,000. Decidedly smaller quantities came from Sherburne, Morrison and Nicollet. The productive counties in 1880 were Benton, Sherburne and Chisago, and the product of that time was valued at \$28,815. The figures speak plainly for themselves as to the great strides which have been made in granite production. The product was devoted most largely to building, the value of the stone thus used being \$209,396; for street work an amount valued \$141,554 was applied. Comparatively very small amounts were devoted to cemetery and bridge work.

Sandstone.—The value of the sandstone output in 1880 was \$41,150; in 1889 it was \$131,979. The product came from seven quarries operated in the following counties: Pine, \$89,750, Pipestone, \$20,279, St. Louis, \$13,950, and smaller amounts in Houston, Rock and Scott counties. Of the total value, \$82,000 worth was devoted to building purposes and the remainder between street and bridge work. The developments which have been made in Pipestone county in what is commercially known as "Pipestone red jasper," are of particular interest. This is a metamorphic quartzite rock of intense hardness, varying in color from cherry to lavender or violet. Its extreme hardness is another important characteristic. The following analysis was made by Dr. C. T. Jackson:

ANALYSIS OF RED PIPESTONE FROM PIPESTONE COUNTY, MINNESOTA.

	<i>Per cent.</i>
Water	8.4
Silica.....	48.2
Alumina.....	28.2
Magnesia.....	6.0
Peroxide of iron.....	5.0
Oxide of manganese .....	.6
Carbonate of lime.....	2.6
Loss.....	1.0
Total.....	100.0

*Report of United States Geological Survey for 1889-90.

The following tests of this stone have been made:

TESTS OF MINNESOTA RED PIPESTONE.

Crushing strength, pounds per square inch.....	23,000
Specific gravity.....	2.8
Weight per cubic foot, pounds.....	170.6

On account of its color and desirable properties which tend to make the stone durable, it is quite popular as a building material and has already been used in the construction of quite a large number of important buildings.

Limestone.—In 1880 limestone was produced from thirty-three quarries scattered over eleven counties of the state. In 1889 the limestone came from seventy-two quarries contained in fifteen counties. Named in the order of the value of their output, these counties are as follows: Hennepin, \$137,728; Blue Earth, \$127,279; Ramsey, \$103,929; Goodhue, \$95,938; Le Sueur, \$41,553; Scott, \$34,030; Washington, \$16,387; Winona, \$13,695; Wabasha, \$12,050; Rice, \$9,700, and smaller amounts from Dodge, Houston, Brown, Fillmore and Olmsted. The total product was valued at \$613,247. Of this an amount valued at \$380,556 was used for building purposes, while \$124,266 was the value of the lime produced. Smaller amounts were devoted to street and bridge work. The great bulk of the limestone comes from counties situated in the southeastern part of the state, where the cities of Minneapolis and Saint Paul form important outlets.

MISSOURI.

The kinds of stone produced in this state are granite, sandstone and limestone.

Granite.—The total value of the granite produced in 1889 is \$500,642. The product came from four neighboring counties in the southeastern part of the state. They are as follows: Iron, \$373,558; Wayne, \$63,842; Saint Francois, \$60,842, and smaller amounts from Madison county. There are ten quarries contained in this area. The stone was about equally divided between general building purposes and paving blocks. The value of the stone devoted to building is \$219,518. The value of paving blocks produced is \$216,986. To bridge, dam and railroad work an amount valued at \$63,638 was applied. A very small quantity was devoted to cemetery uses. The granite-quarrying industry dates back to a short time previous to 1880, but it at present bids fair to develop into an industry of considerable importance to the state. The most extensive quarries are at Graniteville, Iron county. The various plants at this locality are well equipped and supplied with improved machinery. Many of the finest buildings in St. Louis have been constructed of this stone. At Granite Bend, Wayne county, are extensive granite quarries well equipped. In 1887 a shaft 85 feet deep with drifts extending from the bottom of the shaft in various

directions was sunk. It was then charged with 32,700 pounds of black powder. The result of the blast was such that they have stone enough broken up to supply the demands of the firm for fifty years. The cost of the blast was \$16,000. Unquestionably the granite industry in Missouri, although at present in its infancy, may easily assume vast proportions in the near future.

Sandstone.—Sandstone valued at a total of \$155,557 was quarried in the following counties of the state: Johnson, \$100,184; St. Clair, \$15,000; Cape Girardeau, \$12,734; and smaller amounts in Carroll, Barton, Saline, Franklin, Vernon, Holt, Lewis, Buchanan and Henry counties.

Limestone.—The limestone industry in Missouri is a very large and important one. A product valued at \$1,859,960 was produced in 1889. This includes the value of all lime produced, namely, to an amount valued at \$465,390. The productive counties are the following: St. Louis, \$870,276; Jackson, \$211,743; Marion, \$151,908; Greene, \$103,324; Buchanan, \$82,301; Dade, \$72,327; Pike, \$68,127; Jasper, \$41,000; Perry, \$33,070; Clark, \$28,563; Mercer, \$26,287; Lawrence, \$26,060; Callaway, \$24,500; and smaller amounts in Jefferson, Lewis, Wright, Cape Girardeau, Livingston, Andrew, St. Charles, Macon, Clay, Pettis, Cole, Linn, Caldwell, Sullivan, Randolph, Ray, Harrison, Monroe, Saline, Boone, Henry, DeKalb, Webster and Nodaway. The purposes to which the product was devoted are as follows: For building purposes, \$542,871; the value of lime produced \$465,390; for street work, \$670,351; for bridge, dam and railroad work, \$169,720, and small amounts for flux and miscellaneous uses. It is evident that by far the most important county producing limestone is St. Louis county. Many quarries in and around the city of St. Louis are operated. The stone is used for purposes of heavy construction, such as bridge and railroad masonry, building, paving, macadam, riprap, and the manufacture of lime. It is of excellent quality and shows great strength. In some of the quarries steam drills are in use, but in most of them the old methods are adhered to. The manufacture of a superior quality of lime in St. Louis has grown to be an immense industry. Most of the kilns are located just outside the city limits; they are well equipped and numerous. The product is almost entirely used in St. Louis.

The following are analyses of limestone from various localities:

The following analysis of Marion county, Mo., limestone was made by Regis Chauvenet & Brother:

ANALYSIS OF MARION COUNTY, MISSOURI, LIMESTONE.		Per cent.
Silica.....		.08
Alumina and oxide of iron.....		.40
Magnesia.....		.02
Carbonate of lime.....		98.80
Total.....		99.30

STONE PRODUCTION.

These chemists state that this is the purest sample of limestone they have ever analyzed, leaving nothing to be desired for whiteness and purity.

The following analysis of Ash Grove white lime was made by Charles W. Eoff, chemist:

ANALYSIS OF ASH GROVE WHITE LIME.

	<i>Per cent.</i>
Carbonate of lime.....	99.815
Magnesia.....	Trace.
Alumina.....	.054
Oxide of manganese.....	Trace.
Oxide of iron.....	.011
Silicic acid.....	.120
Phosphoric acid.....	None.
Sulphuric acid.....	Trace.
Total.....	100.000

The following analysis of Champion white limestone, Ash Grove, Mo., was made by W. D. Church.

ANALYSIS OF CHAMPION WHITE LIMESTONE, ASH GROVE, MISSOURI.

	<i>Per cent.</i>
Carbonate of lime.....	92.750
Carbonate of magnesia.....	3.260
Silica and insoluble matter.....	.495
Alumina.....	.480
Oxide of iron.....	.400
Sulphate of calcium.....	Trace.
Water.....	.675
Alkalies and loss.....	1.940
Total.....	100.000

ANALYSIS OF LIMESTONE FROM ST. LOUIS COUNTY.

	<i>Per cent.</i>
Carbonate of lime.....	97.76
Carbonate of magnesia.....	.12
Insoluble matter.....	.26
Oxide of iron.....	.20
Total.....	98.34

The following analysis of Lawrence County limestone was made by J. F. Elsom, New Albany, Ind.

ANALYSIS OF LAWRENCE COUNTY LIMESTONE.

	<i>Per cent.</i>
Carbonate of lime.....	85.373
Carbonate of magnesia.....	12.112
Silica.....	1.289
Alumina.....	1.134
Iron.....	.001
Undetermined.....	.091
Total.....	100.000

In northern Missouri limestone is found in every county and is quarried to a greater or less extent over the entire region. With but a few exceptions the quarries are worked on a small scale. The product is used in the immediate vicinity for foundations, cellars, wells, etc. The quarries are generally owned and operated by farmers, who do no work beyond the immediate local demand. Lack of facilities for transportation makes quarrying too expensive to be entered into as a business. Quarries adjacent to government works on the Missouri and Mississippi rivers have supplied quite an amount for riprap. At Ash Grove, Mo., are very extensive limekilns. A large quantity of lime is manufactured of a superior quality. The demand for this lime is very great. It is largely shipped to Alabama, Tennessee, Texas, Arkansas and Kansas, besides being also very largely used in Missouri. Extensive plants for burning limestone into lime are operated at Springfield, the product being used in Springfield, Kansas City and St. Louis. At Cape Girardeau a large quantity of lime of good quality is also produced. At this locality crude petroleum is used as fuel, and it is claimed that a whiter and stronger lime is obtained than can be produced by either wood or coal. The limestone quarries at Grafton produced stone which has been found most excellently adapted for foundation purposes. It is the stone chiefly used in the construction of the great Eads bridge across the Mississippi river.

Onyx.—Quite recently discoveries of onyx have been made in Crawford and Pulaski counties; also in Wright county a deposit has been discovered. This onyx is taken from what is known as the Ozark region, being found in caves in the Ozark mountains within seventy miles of St. Louis.

William C. Day.

[TO BE CONTINUED.]



THE WEATHERING OF BUILDING STONES.

THE term weathering, as applied to stone, includes the series of physical changes induced by alternations of heat and cold, or by friction as well as the more complex series of chemical changes, such as may be comprised under the heads of oxidation, deoxidation, hydration, and solution. Since a stone exposed in the walls of a building may be subjected to the influence of any one or the combined influences of several of these agencies, whereby serious consequences, as of discoloration or disintegration may result, it is important to consider, in more or less detail, their comparative energies under varying conditions and upon the various kinds of stone commonly employed for structural purposes.

(1) PHYSICAL AGENCIES.

Heat and cold.—It is safe to say that none of the conditions under which a stone is commonly placed are more trying than those presented by the ordinary changes of temperature in a climate like that of our Northern and Eastern states. Stones, as a rule, possess but low conducting power and slight elasticity. They are aggregates of minerals, more or less closely cohering, each of which possesses degrees of expansion and contraction of its own. In the crystalline rocks these dissimilar elements are practically in actual contact; in the sandstones they are removed from one another by a slight space occupied wholly or in part by a ferruginous, calcareous or siliceous cement. As temperatures rise, each and every constituent expands more or less, crowding with resistless force against its neighbor; as the temperatures decrease a corresponding contraction takes place. Since with us the temperatures are ever changing, and within a space of even twenty-four hours, may vary as much as forty degrees, so within the mass of the stone there is continual movement among its particles. Slight as these movements may be they cannot but be conducive of one result, a slow and gradual weakening and disintegration.

This constant expansion and contraction is often sufficient in amount to be appreciable in stone structures of considerable size. Thus Bunker Hill Monument, a hollow granite obelisk, 221 feet high by 30 feet square at the base, swings from side to side with the progress of the sun during a sunny

day, so that a pendulum suspended from the center of the top describes an irregular ellipse nearly half an inch in greatest diameter.*

Under such circumstances as these it is not at all strange that many stones show a decided weakening and tendency to disintegration after long exposure, and particularly on those sides of buildings exposed longest to the sun, and which are, therefore, subject to the full range of temperature variations. Professor Julien has called attention to the marked decay thus produced on the western face of tombstones in Trinity church-yard and elsewhere. It is stated further that the ashlar base of the steeple of the church at Thirty-seventh street and Fifth avenue, New York City, is beginning to exfoliate from this cause on the south side (where the sun shines the longest) but not on the north and east. Other examples are seen on the stone stoops of the east and west streets, where the western face of the dark-brown sandstone is badly disintegrated and exfoliated, while the eastern face remains much longer in a perfect condition. The author has observed similar effects, but in a less marked degree, on the Smithsonian building, at Washington, D. C. The south and west sides frequently show exfoliation, while the north and east, upon which the sun shines but a small portion of the day, are almost untouched.

This same expansion and contraction of stone sometimes produces disastrous effects other than those of disintegration within its own mass.

The difficulty of obtaining permanently tight joints even with the strongest cements led Colonel Totten to institute a series of experiments with a view to ascertain the actual expansion and contraction of granite, sandstone, and marble when subjected to the ordinary temperatures. Upwards of thirty experiments on each of these varieties of stone showed the rate of expansion and contraction, which seemed to be uniform throughout the range of temperatures employed, to be for granite .000004825 inch per foot each degree Fahrenheit; for marble .000005668 inch, and for sandstone, .000009532 inch.**

Supposing, then, two coping stones each five feet long be laid in mid-summer at a temperature of 96° Fahr. In winter the temperature falls to zero, a change of 96°. If the stones contract toward their centers, the whole length of the stone put in motion will be five feet. In the case of granite, then, the shrinkage amounts to .027792 inch, in marble .03264 inch, and in sandstone to .054914 inch. This shrinkage, small as it seems, from necessity gives rise to cracks at the joints, which admit the passage of water; continual shrinkage and expansion must in time crumble the cement and leave the joint permanently open.***

The effects of moderate temperatures upon stone of ordinary dryness are, however, slight when compared with the destructive energies of freezing temperatures upon stones saturated with moisture. At a temperature of

30° Fahr. the pressure exerted by water passing from a liquid to a solid state amounts to not less than 138 tons to the square foot, or as Professor Geikie has strikingly put it, is equal to the weight of a column of ice a mile high. Is it, then, astonishing that a porous sandstone exposed in a house-front to be saturated by a winter's rain and then subjected to temperatures perhaps several degrees below the freezing point shows signs of weakness and exfoliation after a single season's exposure?

Since, then, as every quarryman knows, no stone, however strong, can endure the enormous strain to which it would be subject if frozen solid when holding any considerable amount of water confined within its pores, it is but natural to conclude, as a matter of course, that other things being equal those stones are most durable which will absorb and retain the least moisture.†

This rule is not to be accepted, however, without a considerable grain of allowance, since a coarsely porous stone, though capable of taking up a large amount of moisture will also part with it readily, or if frozen while saturated will permit a considerable proportion of the expansive force of the solidifying water to be expended otherwise than in pushing apart the grains composing it. Otherwise expressed, the water will freeze out of a coarsely porous stone, while in one that is compact it may create sad havoc. This is well illustrated by the common occurrence of water freezing in straight cylindrical or widely-expanding vessels, and in narrow-necked pitchers and bottles. In the first instance the open space above is sufficient to allow all the expansion to take place vertically. The narrow-necked vessel, on the other hand, is almost invariably broken.

To ascertain, then, the porosity or ratio of absorption of any stone is an important test.††

Obviously the best method of ascertaining the power of a stone to withstand the effects of frost is to actually expose prepared blocks to such a temperature, when saturated with water, as to freeze them solid and then note the amount of disintegration, or loss in strength. Unfortunately this can not at all times of the year and in all places be done, and artificial methods must be resorted to. Brard's process, as modified by M. Héricart and Thury, consisted in boiling the cube to be experimented upon for half an hour in a saturated solution of sulphate of soda (glauber salt) and then allowing it to dry, when the salt taken into the pores crystallized and expanded in a manner supposedly somewhat similar to that of water when freezing.†††

This process is not now in general use, as experiment has shown that the salt exercised a chemical as well as mechanical action, and produces results somewhat at variance with that of freezing water. The most important series of experiments ever performed with the process in this country were

those of Mr. C. G. Page, made with reference to the selection of material for the Smithsonian Institution Building at Washington.

The results are given in the following table.†

Materials.	Specific gravity.	Loss in grains.
Marble, close-grained, Maryland	2.834	0.19
Marble, coarse "alum stone," Baltimore county, Md.	2.857	0.50
Marble, blue, Maryland.	2.613	0.34
Sandstone, coarse, Portland, Conn.		14.36
Sandstone, fine, Portland, Conn.	2.583	24.93
Sandstone, red, Seneca Creek, Md.	2.672	0.70
Sandstone, dove-colored, Seneca Creek, Md.	2.486	1.78
Sandstone, Little Falls, N. J.		1.58
Sandstone, Little Falls, N. J.	2.482	0.62
Sandstone, coarse; Nova Scotia.	2.518	2.16
Sandstone, dark, coarse, Seneca Aqueduct, Peter's quarry.		5.60
Sandstone, Acquia Creek, Va.	2.230	18.60
Sandstone, 4 miles above Peter's quarry, Md.		1.58
Sandstone, Beaver Dam quarry, Md.		1.72
Granite, Port Deposit, Md.	2.609	5.05
Marble, close-grained, Montgomery county, Pa.	2.727	0.35
Limestone, blue, Montgomery county, Pa.	2.699	0.28
Granite, Great Falls of the Potomac.		0.35
Soft brick.	2.211	16.46
Hard brick.	2.294	1.07
Marble, coarse dolomite, Mount Pleasant, N. Y.	2.860	0.91

The specimens operated upon, it should be stated, were cut in the form of inch cubes. Each was immersed for half an hour in the boiling solution of sulphate of soda, and then hung up to dry, this performance being repeated daily throughout the four weeks which the experiment lasted.

The injurious effects of artificial heat, such as is produced by a burning building, are, of course, greater in proportion as the temperature is higher. Unfortunately sufficient and reliable data are not at hand for estimating accurately the comparative enduring powers of various stones under these trying circumstances. It seems, however, to be well proven that of all stones granite is the least fire-proof, while the fact that certain of the fine-grained siliceous sandstones are used for furnace backings would seem to show that if not absolutely fire-proof, they are very nearly so.††

It must be remembered, however, that the sudden cooling of the surface of a heated stone, caused by repeated dashes of cold water, has often more to do with its disintegration than heat alone.

Effects of friction.—The amount of actual wear to which stones in the walls of a building are subjected is naturally but slight in comparison with those in the sills, steps, and walks, which are subject to the friction of feet and other agencies. Nevertheless it is sufficient in many cases to become appreciable after the lapse of several years. The striking effect produced by wind-blown sands in the Western states and territories has

often been alluded to††† and even in the Eastern states, as at Cape Cod, Mass., there may frequently be seen window-panes so abraded by blowing sand as to be no longer transparent.§

This same abraiding process is going on in all city streets, where the wind blows dust and sand sharply against the faces of the buildings; not with sufficient force, it may be, to perceptibly wear away the fresh stone, but yet forcibly enough to crumble away the small particles already loosened by atmospheric decomposition and thus expose new surfaces to be acted upon. Professor Egleston§§ states that in many of the church-yards of New York City the effects of this abrasive action can be seen where the stones face in the direction of the prevailing winds. In such cases the stones are sometimes worn very nearly smooth and are quite illegible from this cause alone.

Effects of growing organisms.—It is in such exposed situations, as above mentioned, that a stone is often protected from serious loss by a coating of lichens or mosses, which by growing over its surface shield it from the abrasive action. The full effect of growing organisms upon the surface of stones is still, however, a matter of dispute. By some authorities§§§ it is thought that they give rise to small amounts of organic acids which exercise a corrosive influence. By others they are considered as beneficial, since they protect the stone from the sun's rays and the rain and wind. It seems probable that they may exert either a harmful or beneficial action according to the kind of stone on which they grow and its environment. More observations are necessary before anything definite can be said.||

* Dana, Manual of Geology p. 720.

† Adie found the rate of expansion for granite to be .00000438 inch, and for white marble, .00000613 in.—Trans. Roy. Soc. Edin., XIII. p. 366.

‡ W. H. C. Bartlett on Contraction and Expansion of Building Stone.—Am. Jour. Sci., Vol. XII. 1832, p. 136.

† "Other things being equal, it may probably be said that the value of a stone for building purposes is inversely as its porosity or absorbing power." (Hunt, Chem and Geol. Essays, p. 164.)

†† Hunt in a series of tests obtained results as follows:

Potsdam sandstone, Canada, absorbed from 0.50 to 3.26 per cent. in twenty-four hours.

Medina sandstone, Canada, absorbed from 3.31 to 4.04 per cent. in twenty-four hours.

Sub-Carboniferous sandstone, Ohio, absorbed from 9.59 to 10.22 per cent. in twenty-four hours.

Lower Silurian limestones and dolomites, Canada, absorbed from 0.11 to 5.55 per cent. in twenty-four hours.

Tertiary limestones, Caen, France, absorbed from 15 to 16.05 per cent. in twenty-four hours.

††† Chateau, Technologie Du Batiment, Vol. 1, p. 262.

‡ From Hints on Public Architecture by Robert Dale Owen, p. 119.

†† Cutting's experiments (Weekly Underwriter) showed that up to the point at which they are converted into quicklime (that of bright redness), limestones are less injured by heat than either granite or sandstones, a result not fully borne out by the experiments of Winchell (Geol. of Minn., Vol. 1, p. 197-201).

††† On the Grooving and Polishing of Hard Rocks and Minerals by Dry Sand. W. P. Blake. Proc. A. A. A. S., Providence meeting.

‡ There is on exhibition in the National Museum a plate of glass formerly a window in the light-house at Nauset Beach, Massachusetts, that was so abraded by windblown sand during a storm of not above forty-eight hours' duration as to be no longer serviceable. The grinding is as complete over the entire surface as though done by artificial means.

‡‡ Am. Arch., September 5, 1885, p. 13.

‡‡‡ See Winchell, Geol. of Minn., Vol. 1, p. 188.

¶ The vegetation of microscopic lichens takes place upon the surface of the stone, when, from any cause, that surface becomes roughened so as to afford a lodgment for the seeds or spores of these plants. These growing, still further hasten the disintegration of the stone, and accumulating about them the fine dust floated by the atmosphere becomes points for the absorption of more water, which on freezing, still further roughens the surface, and the patch of lichen gradually extends. These lichens often gain attachment upon the surface of a finely dressed stone, from some little inequality of texture, or from softer material that more readily becomes decomposed or more readily accommodates the growth of the plant. Such stones in time become partially or entirely covered by lichens, and present an unsightly aspect. The amount and degree of this growth varies with position in reference to the sun and with a more or less elevated situation.

It should not be forgotten, however, that any stone giving root to lichens is not one of those which most easily disintegrates, for in these the destruction goes on so rapidly that the surface does not allow the growth of such plants. The lichen-covered rocks in nature are usually those of great strength and durability. None of the softer or rapidly decaying rocks produce this vegetation. (Rep. on Building Stones by James Hall, 1868, p. 54 and 55.)

[TO BE CONTINUED.]

Geo. P. Merrill.



SAMPLES RECEIVED.

FROM Joseph H. Brinton, Thornbury, Pa., a sample of Conestoga sandstone. This is one of the most beautiful specimens of red sandstone that it has ever been our pleasure to look upon. It is of a light color, and of apparent great durability, more closely resembling the Potsdam in this respect than any sample in our collection. Mr. Brinton writes concerning it: "It belongs to the new red sandstone formation, and appears to have been a beach formation of the new red sandstone sea. Nearly all of it has been lost by erosion. The sample was found on the top of a mountain, apparently an isolated cap that had escaped the general destructive agency of the later overflow. I furnished this stone last season for a \$50,000 residence and two churches. I do not know of this stone having been found elsewhere. The supply is limited and the demand extraordinary."

From Frank A. Kimball, National City, Cal., several finished samples of variegated marble of most beautiful design. What is remarkable respecting this marble is that the samples are stated to have been cut from croppings twenty-five feet above the surface of the ground. In the formation it is further stated that nearly every color and tracing imaginable can be found, all distinct shades. Mr. Kimball has in this property, producing the grade of stone these samples indicate, something as valuable as a gold mine. We understand it is the purpose to organize a company to develop the quarries and that a practical marble man of means is being sought to assume an active interest. The quarry is stated to measure 150x1,000 feet, strata nearly perpendicular. We expect soon to show photographic illustrations of this remarkable quarry. Any one interested may examine the samples in our office.

From the American Rose Garnet Company, of New York City, a mottled stone known as rose garnet. It comes from Xalostoc, district of Cuautla, Mexico. We are unable to properly classify this material under common terms. It is a very beautiful stone, saws up easily, and is worked without difficulty under the polishing wheel. Mr. George F. Kunz, the noted expert on ornamental and precious stones, in a personal letter to STONE, speaks very highly of the product. The company is prepared to quarry the stone and answer any demand for it.

The two members of the New England Granite Manufacturers' Association, Norcross Brothers, of Boston, and John Pierce, of New York, still resist the demand of the National Granite Cutters' Union for the employment of union men. Five hundred men are still out, and a per capita tax of 12½ cents sustains them.

FOR SALE, WANTED, ETC.

WANTED—Contract to furnish blood-red marble or yellow marble, of a hard, tenacious quality; any common thickness or length. **THE JASPER MARBLE COMPANY**, room 75 Sheldon block, El Paso, Texas.

WANTED—A quarry superintendent who has had experience in brownstone quarrying, erecting saw mills, sawing stones, derricks, etc. I will be glad if parties desiring such position will correspond with me. **JOHN W. HINSDALE**, Raleigh, N. C.

WANTED—POSITION—A practical stone cutter with a thorough experience as general foreman of stone and brick masonry is open for engagement as general foreman or superintendent, or would take charge of a cut-stone business. Can furnish references. Address **A. Barr**, 189 Bell ave., Cleveland, Ohio.

WANTED—A steady, sober and competent granite and marble letterer, one who can take charge of shop can have desirable position at good wages by addressing **SANDS & WOOLDRIDGE**, Elmyria, Ohio.

WANTED—SITUATION—As manager or foreman in monumental yard thorough practical marble and stone cutter. Turning; letter cutting of imperishable letters; also well up in the erection of monuments. Twenty-five years experience, thoroughly steady. **F. L. GREENWAY**, 328 Bergen St., Harrison, N. J.

WANTED—The irons for a 15-ton Derrick. Parties having articles to sell will please give lowest cash price and full particulars. **JOHN W. HINSDALE**, Raleigh, N. C.

WANTED—Traveling salesman to travel for a wholesale and retail granite house; also twenty-five granite cutters. Address **BRADDOCK GRANITE CO.**, 316 W. Markham St., Little Rock, Arkansas.

WANTED—Position as manager or foreman of cut-stone yard; have had experience in both hard and soft stone. Am successful in handling men, and can give any required reference. Address **J. M. FISH**, 33 W. Columbia St., Springfield, Ohio.

HORSES are FED, WATERED and CLEANED to keep them in good order. Why neglect their feet without the proper use of which they are worthless?

Driven on hard roads the foot is the first part of the horse that will show signs of wear and the horse is soon laid up lame.

Therefore take the advice of the wise man who said "leave nothing to what is called luck and you will generally be considered lucky." The universal opinion of the best horsemen in the country is that

Campbell's Horse Foot Remedy

as a hoof grower has no equal. By applying it to the foot daily it starts up a healthy growth and the horseshoer trims off all dead and diseased parts, leaving the foot always in good condition.

1/4 Gal. Cans, \$1.00 1/2 Gal. Cans, \$1.75
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To be had of All Dealers.

Send for a 48 page book on diseases of horses feet, containing 15 illustrations, with full system of shoeing can be had of all dealers or mailed free to any horse owner by

The Jas. B. Campbell Company
414 West Madison Street. CHICAGO.

Hawley's Patent Sand Feed

Is used by all the leading firms—saws faster and better than any other sand-feed. More gangs using our feed than any other. Easily kept in order. Over 50 gangs working satisfactorily, using either crushed steel or shot with our feed. Can give best of references.

Orders solicited.

E. J. & C. H. HAWLEY, MANCHESTER, VT.

WANTED—Fine designs of monuments and scutlery to make for retail trade. **R. A. CURTIS**, 14 Cyclorama Place, Indianapolis, Ind.

WANTED—Three good marble carvers. Address or apply **DAVIDSON & SONS**, foot North Market st., Chicago.

WANTED—Travelling salesmen, having experience in granite business, to solicit orders and place with dealers and contractors, for all purposes, one of the best granites in New England. Give references and state salary expected. Address **J. L. MARTIN**, Vice-President, Lyons Granite Co., Brattleboro, Vt.

FOR SALE OR LEASE—Brownstone quarry on the L. E. & St. L. railroad. Address **290 Vincennes St.**, New Albany, Ind.

FOR SALE—A fine white lim stone quarry on easy terms. Railroad connections. For particulars address **P. FRIEDRICH & SON**, Box 12, Columbia, Monroe Co., Ills.

FIRST-CLASS FOREMAN

WANTED—A first class foreman, for a sandstone quarry, good wages and steady work for a sober, reliable man. Address **S. CASPARIS**, Marble Cliff, Franklin Co., Ohio.

FOR SALE, MARBLE QUARRY

At Tuckahoe, N. Y. The largest of the Tuckahoe marble quarries, with complete equipment of twenty-ton derricks, Channeling Machines, Boilers, Engines, Etc., including a Ten-Gang Saw Mill, Rubbing Bed, large stone cutters' shop and everything in readiness to start work at short notice. The vein is about 300 feet long. Address **S. J. HARRIOT & Co.**, 10 Wall street, New York City.

THE SCIENTIFIC POLISHING WHEEL must be O. K. when letters like the following are written to **GEO. B. ECKHARDT**, No. 909 Bancroft St., Toledo, O.:

Mr. Geo. B. Eckhardt: ANGOLA, N. Y.
DEAR SIR:—I received the wheels, and find them as you recommended. We can do more with them in two hours than we could with the old style in ten, and am more than pleased. Respectfully yours,
C. A. GATES.



VANDUZEN STEAM PUMP JET
THE BEST IN THE WORLD.
Pumps Any Kind of Liquid.
Always in Order, never Clogs nor freezes. Every Pump Guaranteed.
10 SIZES.
200 to 12000 Gallons per Hour.
Cost \$7 to \$75 each. Address
THE VANDUZEN & TIFT CO.,
102 to 108 E. Second St., Cincinnati, O.

BOOKS AND PERIODICALS.

The high lights of the April *Century* are Anarchists and Arbor Day. The number opens with a notable article on "The Chicago Anarchists of 1886," being a review of their crime, trial, and punishment, written by Joseph E. Gary, the judge who presided at the trial. Judge Gary takes as his motto these words from his charge to the jury, "And the law is common sense." The paper will stand for all time as an authoritative record of this celebrated case. It is illustrated with portraits of the judge, the prosecuting attorney, the jury, inspectors of police Bonfield and Schaack and Captain Wm. Ward, and also by striking full-page views of incidents carefully drawn by Castaigne from descriptions of eye-witnesses. There are also reproductions of the anarchist handbills and sketches of explosives found in the possession of the prisoners. The subject of the anarchists is treated in an editorial article under the title, "Words are Deeds, and May be Crimes."

This is, in a certain sense, an Arbor Day number of the *Century*, this flavor being supplied in part by an article on the Arnold Arboretum of Harvard University, described under the title of "A Tree Museum," by Miss M. C. Robbins.

A richly illustrated paper is by Mrs. Oliphant on "The Princess Anne," of whom as queen the writer will speak in the May number.

In the American Artists Series there are two notable examples, one a scene on the coast of Etretat, from a painting by George Inness, and the other a reproduction of the relief "The Angel of Death Staying the Hand of the Sculptor," by Daniel C. French, whose statue of the Republic is being erected at Chicago. In articles of personal material there is a critical sketch of Margaret Fuller, with unpublished letters by her and a portrait after the painting by Thomas Hicks, and further passages from the correspondence of General and Senator Sherman, bringing to a conclusion "The Letters of Two Brothers." In fiction, besides the sixth part of Mrs. Burton Harrison's "Sweet Bells out of Tune" and the fifth part of Wolcott Balestier's "Benefits Forgot," there are two illustrated short stories, "The Cash Capital of Sunset City," by Hayden Carruth, and "Idy," by Margaret Collier Graham. Among the poets of the number are Edgar Fawcett, Walter Learned, Lizette Woodworth Reese, John W. Chadwick, Edith Vernon Mann, Jennie E. T. Dowe, Frank Dempster Sherman, and Edith Willis Linn, and the department "In Lighter Vein" contains an unusual variety of lively contributions. An Open Letter on "Governmental Care for Workingmen" is devoted to a unique account of Ohio's Free Public Employment Offices (by C. C. Johnston); another Open Letter is an account of what Germany is doing for workingmen, by M. Carey Lea.

Indiana readers will observe several things of local interest to them in the April number of

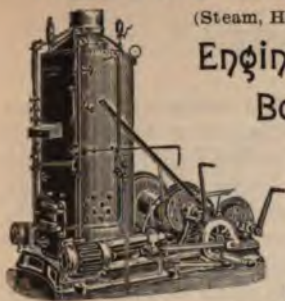
the *Review of Reviews*. Thus the frontispiece of the number is a finely executed drawing of the great battle ship "Indiana" as she will look when she is finished. A new portrait of Judge Gresham appears in the brilliant character sketch of Mr. Cleveland's Cabinet, and the author of that article has some very interesting comments upon this distinguished son of Hoosierdom. In an article upon the question how women ought to dress at the world's fair are two attractive photographs of a popular young Indianapolis lady, Mrs. Lillian Wright Dean, from photographs taken for the *Review of Reviews* in a short walking dress which Mrs. Dean had the courage to wear on the streets of Indianapolis in a snow storm a few weeks ago. Mrs. Dean's costume was reported as really being the envy of all beholders in Indianapolis, and its comfort and attractiveness will doubtless lead numerous other ladies to adopt something like it. Mrs. Dean is the niece of Mrs. May Wright Sewall. The March number of the *Review*, by the way, contains the best portrait of ex-Attorney General Miller that has appeared in any of the periodicals, and the issue for last July published the most elaborate and discriminating character sketch of President Harrison that has ever been given to the public. In the present (April) number is a life-like pen-drawing of the Hon. D. W. Voorhees, the new chairman of the Finance Committee of the Senate. The *Review of Reviews* this month further shows its touch with Western matters by publishing an interesting portrait of Carter Harrison, who is making his fight for a fourth or fifth term as mayor of Chicago, and also publishes a line-drawing of Mr. Allerton, the Republican candidate. The April number as a whole is a magnificent one, profusely illustrated and thoroughly alive, covering an amazing range of topics in the condensed straightforward fashion which has given this periodical the well-earned appellation of "The Busy Man's Magazine."

Every admirer of the beautiful in art should take advantage of the offer made by *The Home-Maker* magazine, which is giving a coupon to its readers that will help them to secure "A Yard of Chrysanthemums" and a magnificent photochrome of Tennyson, Bryant, Whittier, or Longfellow, all beautiful productions in three tints, and all well fitted to grace the walls of any home. This coupon is printed in the magazine. *The Home-Maker* magazine is steadily attaining an enormous circulation, due to its excellent articles, its superb illustrations, and, above all, its untiring efforts to secure matter of interest to every class of readers. People have discovered that they find everything, both practical and intellectual, in *The Home-Maker* for \$2.00 a year, and this is the reason why it is becoming one of the most popular and widely circulated magazines in this country. Its recent growth has been phenomenal.

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Engines,
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HOISTING ENGINES of any power or style, SINGLE AND DOUBLE CYLINDER, with improved patent friction drums especially adapted for all classes of work. Single and Double Drum, friction and direct geared, link motion Mining Engines. Four, six and eight spool, lock clutch, self-propelling BRIDGE ERECTING Engines.

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IS MAKING A SPECIALTY OF

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Red and Gray Granite

Building, Bridge, Monumental,
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Capacity, 30 cars per day.

STEAM PLANT.

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I HAVE IT.

A Rubber Spring for the Wardwell Channeler

That beats them all. Have captured the trade of this vicinity, and am getting any number of orders from a distance. MAY I HAVE YOURS? Springs sent on three months' guarantee.

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SPIRAL

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For Feeding Sand and Water to Saws for

SAWING STONE.

Of all Kinds. Does More Sawing, Uses Less Sand and Water, Requires Less Power and Repairs than any other. Runs only 20 revolutions per minute; Pays for itself in Six Months.

Cleveland, O., Oct. 1, 1889.

Messrs. Frenier & LeBlanc, Rutland, Vt.
Gentlemen: We are running 33 gangs with your sand feed, and see no reason to change our opinion as to the superiority of your machines. They will pay the entire expense of putting them in this season.

Yours truly, THE CLEVELAND STONE CO.

Write for Catalogue and Testimonials.

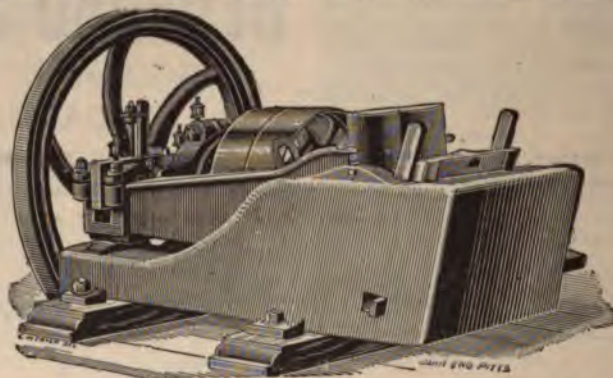
J RENIER & LeBLANC, Rutland, Vt.

ADVERTISERS' DEPARTMENT.

A POPULAR ROCK-BREAKER.

We desire to call the attention of our readers to the illustration of a rock-breaker on this page that is largely used all over the country in the construction of macadam roads. The design of this crusher was gotten up and patented by an engineer in the employ of Totten & Hogg, Pittsburg, Pa., and special attention was given to the following points in producing the machine: First, the leverage is so long that a minimum of power is required, and this is a very desirable feature in some parts of the west where fuel is very expensive. In the second place, all the parts are specially heavy (many of them being of steel) so as to resist the tremendous strain required of machinery

the manufacturers by a company in Cincinnati. Another important feature of this machine is that, should any sledge or other pieces of heavy iron get in between the dies, arrangement has been made so as to prevent any expensive breakage of the machinery, and the greatest damage will not amount to more than one or two dollars to repair the breaking piece. The fly-wheel is turned and balanced, and the machine runs almost as lightly as an automatic sewing machine. The face of the pulleys on the crusher are made of rolled steel, so they are almost indestructible. The machine will crush twice in a revolution, and thus enhance the amount of product. Another feature of the machine is that the dies nip the stone off and make a product as near a cube as is possible



breaking granite boulders or anything of that description, at the same time it is not so heavy as to be clumsy; it can be readily moved from place to place, when desired. All the bearings in this machine are lined with brass and babbitt metal so as to prevent any friction when the machine is being run to its highest capacity. Another point in its favor is, it is so simple that any ordinary laboring man can operate it, and is all ready to attach driving belt when shipped by the manufacturer. The dies are specially made from the very finest grades of charcoal iron, cast against iron moulds; they will last for several years crushing the hardest limestone; and a special feature in the lever die is that, when it is worn at the bottom it can be reversed and is practically as good as new. All the bearings are protected so that no dirt or dust can get into them, and they are oiled up with a special drop-feed oil cup, made for

with machinery, and does not crush the stone like a battering-ram, producing a large amount of fine material, dust or sand. The dies in this machine are regulated by a tapered wrought iron key at the back of the bed die, which will make the product either coarse or fine as desired. The manufacturers have such a large demand for these machines that they carry a stock of the different sizes on hand, and are generally able to furnish machines as soon as ordered, so as to accommodate their patrons, and get the very lowest freight rates through to destination. They have lately sold machines to Japan, South America and Europe, and have sold a number of their largest sized machines for macadam, one of them being to the engineer in charge of the hydraulic canal just put in at Niagara Falls to utilize the water power.

D. V. JOHNSON, Pres't.

E. B. THORNTON, Sec'y.

THE BEDFORD STEAM STONE WORKS,

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Buff and Blue Bedford Limestone,

ROUGH, DIMENSION AND SAWED.

Quarries in Dark Hollow, Ind. Mills and Yard at Bedford, Ind., on L., N. A. & C. and E. & R. Railways.

The only Stone Mill here having switches from Competing Railroads.

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Specify the "Celebrated Cream Buff Stone," (grades 1 and 2), from the HENRIETTA QUARRY of the

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Sample Cubes soon ready for Architects and Builders.

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Celebrated Vermont Building Slate,
STEPS, PLATFORMS, URINALS, TUBS,
Cemetery Work, Vaults, Catacombs,
BILLIARDS, MANTEL STOCK. ESTIMATES GIVEN QUICKLY.

TRADE MARK:
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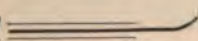
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Quarries and Mills at Rockwood, Ala.

Largest Plant and Best Facilities in the South.

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G—Stone.

x

THE ENGINE ROOM.

A very interesting discussion in progress among steam users is regarding the comparative advantages of steam and gas for motive power. Gas engines of 150 horse-power are not infrequent and engines of much greater capacity are talked of and projected. The gas engineers have tightened their belts for a long and hard race with steam. That the gas engine will be largely used in electric lighting is conceded by all who have examined the question, but the extent to which gas will displace steam in other avenues is more of an open question. This is an age of evolution, and the scientific and practical minds were never so much in earnest as at present to upset old notions and foundations and erect new things, theories, standards and new applications of forces. The gas engineers have the ear of the public but they are modest in their promises as to immediate results in making economic changes.—*American Manufacturer and Iron World*.

A man who uses steam ought to know something about its management, and ought to visit the power plant occasionally at least. If this were done, there would be better service in that department, and there would be fewer explosions and engine room accidents, for the incompetency of the engineers and firemen would frequently be discovered in time to avert the calamities which so often startle the community and leave wreck and ruin in their trail. While such remarks as these may seem to have little weight, their wisdom will be readily attested by thousands who have acquired a knowledge of their truth by long years of experience.—*Age of Steel*.

A good way to insure perfect service in the steam department is to hire men who understand their business. We do not believe boilers explode or accidents happen because employers do not visit the engine room. Just how an employe can discover the incompetency of an engineer by visiting the engine room no one but an outsider can tell. The first two hours tells the story of a man's ability, if the plant is in order.—*The Engineer*.

Heating by exhaust steam is coming into greater favor each year, but one thing that is being learned by experience is this, that to

work the system properly it must be properly piped or else will require the addition of considerable back pressure to force it through the system. A heating system that requires more than three pounds back pressure to operate it must be considered deficient in arrangement, and it will well repay the owner for the labor expended in straightening it out, that the steam may have fewer obstacles to overcome. Systems for erecting a vacuum in the pipe system are now much in favor. They reduce the back pressure on the engine and thus save in fuel, besides giving an efficient heating circulation for the exhaust steam.—*Boston Journal of Commerce*.

The scientist asserts that there is no economy to be gained by wetting coal, because, if the water is decomposed, it will require as much heat to effect the decomposition as is yielded by the reunion or combustion of the gases. There would rather, he says, be a loss, from the fact that the steam or vapor into which the water would be converted, whether dissociation took place or not, would convey heat away on its passage to the stack. On the other hand, the man who is constantly handling coal will tell you that it burns better and goes further if judiciously moistened, and he knows it all.

An explanation has been suggested in the fact that wetting retards the immediate and violent distillation which follows the introduction of new fuel, and that under these circumstances decomposition takes place in the furnace, where the sheets get heat enough anyway, and the reunion or combustion of the dissociated gases takes place further along in their passage to the stack, where the heat can be better applied. In other words, the water, by its decomposition, takes heat from the furnace, and by its subsequent combustion distributes it over the heating surface of the boiler to better advantage than if it were concentrated under the first fire sheet.

Recent experiments, too, have shown that a considerable quantity of aqueous vapor is necessary to facilitate the union of furnace gases with the oxygen of the air. It may be to this fact, rather than to the extra flow of air induced, that the steam jet owes its efficiency as a smoke preventer.—*Power*.

WATERPROOF
GRAPHITE GREASE
FOR WIRE ROPES, GEARS, ETC.

An unequaled lubricant which will not wash off. It may pay you to send for circulars.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.



H. CHANNON CO., 22 to 26 Market-st., Chicago, Ill.,

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Charcoal Iron Rope, Galvanized Iron Cable, Manila Rope and Blocks for Wire and Manila Rope

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Best on Earth

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[Trade Mark Registered.]

920 & 922 N. Main Street,

ST. LOUIS, MO.

For sale by Scoville Iron Works, Chicago, Ill.

NOTES FROM THE QUARRIES.

J. G. Fairbank, of Marion, O., has purchased the Kelly stone quarries of P. Kelly, the administrator of the David Kelly estate. The price paid was \$5,000.

We were in error in stating in last month's *STONE* that D. R. Beatty had been appointed superintendent of the North Carolina Brownstone Co., at Sanford, N. C. Mr. Beatty has taken the superintendency of a new company. Mr. J. E. Malloy, for some time in charge of the quarries of the above-named company still retains that position, to the perfect satisfaction of the company.

The Allegheny quarries, near Columbus, O., has shipped a quantity of stone to Chicago to be used in a column of the Ohio building at the World's Fair.

Preparations are now being made to resume work at the Windsor stone quarries, owned by Youngstown and Pittsburgh capitalists.

The new stone quarries at Hop Hollow, near Alton, Ill., are being opened up as fast as possible. This enterprise is starting out upon an enormously large scale, and is to prove the largest stone industry in or about the city.

The quarries at Emigsville, Pa., have been opened for the season by their proprietors. Lime and sandstone is obtained from them.

The bluestone quarry at Uniontown, Pa., will resume active operations in the near future.

E. F. Etta and Thomas Fisher, of Toughkenamon, Pa., have formed a partnership for the purpose of taking out feldspar for the firm of Smith & Steel, who own the feldspar mills in that township. The two gentlemen have placed a powerful force pump, engine and drum in the quarries for the purpose of operating on an extensive scale.

A beautiful gray stone, found in Robeson township, Pa., has just come into use in the construction of private residences. One party is endeavoring to obtain a lease on some of the principal quarries in the township.

From base to summit of an immense mountain of dark red sandstone, 800 feet high, in Weber Canon, Utah Territory, is a smooth, white stone floor, with all the appearance of a slide, reaching from the top of the mountain to the bed of the Weber River. This is not inappropriately named "The Devil's Slide."

Two derricks are being erected at Valley View slate quarry, Salem, N. Y., by the proprietor, John M. Williams. A steam drill and hoisting apparatus will soon be in position and work actively pushed at this promising quarry. The slate is unfading green and of excellent quality. The old Excelsior quarry, not far from the Valley View, will be reopened this spring. The slate is of prime quality. The problem has been, how to work it profitably. Skill and steam will do it.

THE POTSDAM RED SANDSTONE CO.,

POTSDAM, N. Y.

The stone produced by this company is unequalled in beauty, strength and durability. Commended by the highest expert authority. Used in many of the finest buildings in the United States and Canada.

Prompt Shipments Guaranteed. Estimates for Stone cut from Drawings and delivered free on board of cars, ready to lay in the Building.

Specialty.—RANDOM ROCK-FACED ASHLAR FACINGS, ready cut, including ROCK-FACED JAMBS AND CORNERS, shipped from stock in any quantity. Apply for samples (free and prepaid to Architects only), pamphlet and prices, as above.

Headquarters for **SAW BLADES.** **J. PAINTER & SONS COMPANY,**

Pittsburgh Iron and Steel Works, Pittsburgh, Pa.

We Make a Specialty of BLADES for SAWING STONE, MARBLE, Etc. All our saws carefully cut to Exact Lengths Required and Straightened.—Hoop and Band Iron, Lock Plate Iron, Hinge Iron, Cotton Ties. Write for Prices Delivered Your Place.

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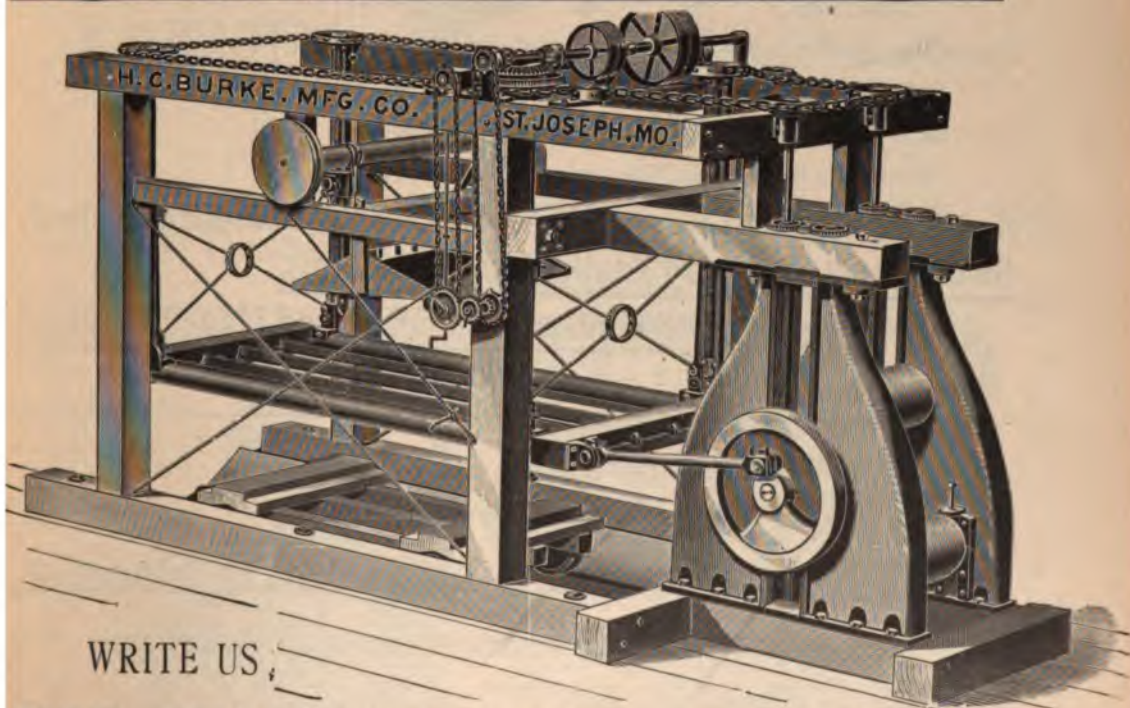
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Wholesale Manufacturers and Dealers in all Kinds of

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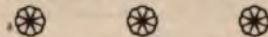
TURNED COLUMNS, CAPS, BASES, BALUSTERS, FINALS FOR BUILDINGS.

Posts, Vases, Founts, Everything in the Turning Line Neatly Executed. Cut-Stone Fronts, Cemetery Vaults, All Kinds of Stone Trimmings, etc.

BEDFORD STONE,

Blue and Buff.

Mills and Workshops at the Junction of the L., N. A.
& C. Ry., the B. & B. R. R., and the E. & R.
R. R. Shipping facilities unsurpassed.



Regarding Quality of Stone and Workmanship, we
refer to the Mutual Life Insurance Building
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Quarries in Dark Hollow.

Stone Fronts, Cemetery Vaults, Large Platforms,

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Send Plans for Estimates.

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REITZ & CO.,

QUARRYMEN AND MANUFACTURERS OF

Portsmouth Blue and Buff Stone,

BUILDING, FLAGGING, CURBING AND BRIDGE STONE.

Located on B. & O., S. W., N. & W., C., P. & V. and C. & O. Railways; also shippers via Ohio river. General Office, Portsmouth, Ohio.

Shipping facilities unsurpassed.

Write for sample.

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WORCESTER, MASS.

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Makers of Iron and Steel Wire for all Purposes.

Manufacturers of Wire Rope and Cable

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IRON, STEEL AND GALVANIZED, FOR HOISTING AND GUYS.

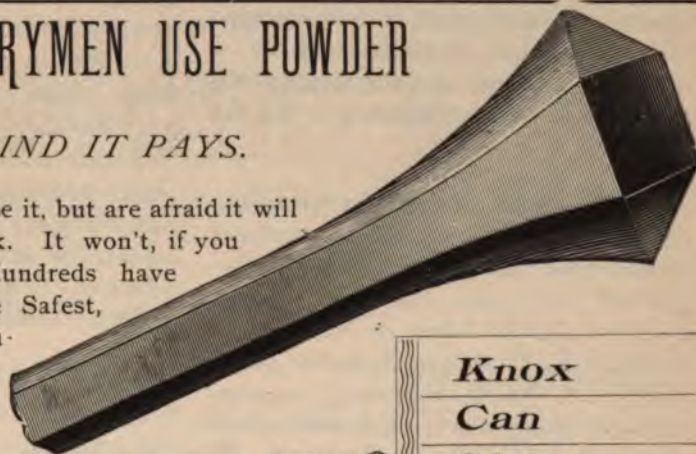
Fittings of All Kinds Attached to Ropes when Desired. Prompt Shipments from Stock.
Chicago Office and Warehouse.

107 & 109 LAKE STREET.

SOME QUARRYMEN USE POWDER

AND FIND IT PAYS.

OTHERS would use it, but are afraid it will damage the Rock. It won't, if you know how. Hundreds have learned that it is the Safest, Speediest, Most Economical Way to Quarry



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THE KNOX ROCK BLASTING COMPANY,
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STRONGEST AND SAFEST DYNAMITE EXPLOSIVE
KNOWN TO THE ARTS for all Mining, Railroad
Work, Rock and Stump Blasting.

FUSE, CAPS, BATTERIES AND ELECTRIC MINING GOODS.
Hercules Powder Co., 40 Prospect St., Cleveland, O.
J. W. WILLARD, Gen'l Manager.

Indianapolis Office, 81 West Washington Street.

The Monson slate quarries, at Monson, Me., have been running a short time through the winter months, but began recently on ten hours a day, with a favorable outlook for a busy season ahead.

A species of marble has been discovered near Washington, Vt., on land purchased of Dan P. Smith by Williard Clough, and the owner, in company with George E. Huntington, is now engaged in the business of prospecting for a quarry. Future developments are awaited with great interest by all the community.

The Augusta Granite Company, incorporated at Hallowell, Me., to work the Fuller quarry on Oliver's ledge, has organized with the following officers: President, A. T. Dolan of New York; treasurer, A. T. Fuller, Augusta; secretary, W. A. Quinn, Hallowell; superintendent, Philip Cary, Hallowell; directors, A. T. Dolan, A. T. Fuller, W. H. Quinn, Philip Cary and James Lerussi. The quarry commenced operations recently.

The Maryland Granite Company, at Bel Air, Md., are preparing to resume work at their quarry, the Rocks of Deer Creek. It is reported that their operations will be largely extended this year, giving employment to an increased force.

John Downs, one of the proprietors of the Downs & Gorman stone quarry, south of Halley, N. Y., has leased his interest in the quarry for the season of 1893 to George Crane, of Albion, who will take the active management.

The demand for building and other stones about Steeltown, Pa., is so great at present, that the large quarries at the eastern end of the borough are being pushed to fill the orders.

The Shaler & Hall Quarry Company, of Portland, Conn., has received a new boiler and engine to be used for hoisting purposes. The engine is built by J. S. Mundy, of Newark, N. J. and is a double cylinder, single drum engine with 14x24 cylinders. It will lift thirty tons or in other words would raise an ordinary railroad car loaded with stones out of the quarry. The boiler is one hundred horse power and stands fourteen feet high and is six feet in diameter. A new engine house will be erected at once. The company has also lately purchased a locomotive crane with a lifting capacity of ten tons. The machine is complete in itself, furnishing its own motive and hoisting power, and is constructed on the same principal as the cranes used by the wrecking trains of our railroads.

The Woodstock, Md., Granite Company has quarried a stone twenty-four feet long and weighing from six to seven tons. The person to whom the stone was sold is anxious for its delivery, but it cannot be moved from the quarry on account of the bridge at Woodstock not being strong enough to admit of its being hauled over.

The Excelsior Slate Company are busily taking off top so as to connect the two holes in which they now work, thus greatly enlarging their quarry. They now have ready 1,500 squares of slate awaiting orders. They are making several repairs to their boiler, etc., to facilitate operations.

Herr & Bennett have about 1,200 squares of slate on their bank at this time and they have recently had an order for 900 squares. At present their quarry is so dangerous that very little work can be done. They expect to make some large shipments this spring.



ROCK DRILLS,
AIR COMPRESSORS,

STONE CHANNELERS.
HOISTING ENGINES.

COMPLETE PLANTS OF

Mining,
Tunneling,

MACHINERY,

Quarrying,
Contractors'.

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THE INGERSOLL-SERGEANT DRILL CO.

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MAKERS OF

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Stripping Coal and Ore, Railroads, Con-
tract Work, Brick-Yards, High-
ways, Etc., Etc.

—ALSO—

STEAM DREDGES.



In Your Correspondence with Advertisers
ALWAYS MENTION "STONE."

Six firms extensively engaged in quarrying stone for building purposes in Reading, Pa., have formed a combine and decided hereafter to sell stone for delivery at \$1 per perch, either by measurement or weight, 2,800 pounds for a perch. Heretofore there was at times a general "cut" in prices.

The prospects for slate in the upper part of Harford county, Md., is very bright. Several new veins have been struck, which, it is thought, will yield a large supply.

A boiler explosion occurred at Conrad Fluxing's stone quarry, near Isbell, Ala., recently, and as a result two men were killed and one injured. The boiler was used in operating the steam drill at the quarry and the men who were killed were engaged in operating the engine.

The Iron River Brownstone Company, of Superior, Wis., has been formed with \$150,000 capital.

The Peerless Slate Company were so unfortunate as to break their pump, but they are again at work making the best of slate, and have about 2,000 squares ready for shipment.

R. R. Lloyd has been further developing his quarry on the south spur of the Ridge and has partially uncovered what promises to be a vein of very fine slate. —*Delta (Pa.) Times.*

Mr. Fred Ward, of Uniontown, Pa., has leased the limestone quarry of T. and R. P. Cook, near Tippecanoe. He has a force of workmen employed in getting out stone and making preparations to ship it.

Ammon & Tigh, Reading, Pa., owners of the brownstone quarries at Reinholds and Vinemont, have eighty men employed.

David Williams, one of the best known slate operators of the state, died of apoplexy at Slatington, Pa., aged 71 years.

The prospects for the slate business in the lower end of York county, Pa., the coming spring are very bright. All the quarries have quite a large stock of slate on hand.

Proctor Bros. are working steadily, and have about 1,700 squares now on hand.

Fuller Pegg has opened a stone quarry on the Connellsville road near Mountain View park, Pa.

THEIR OWN EMPLOYEES.

James Grant, secretary of the Paving Block Cutters' National Union, who, with Joseph Dyer, secretary of the Granite Cutters' National Union, superintended the series of strikes and lockout which nearly paralyzed the granite industry through New England last summer, arrived in New York from the co-operative quarries in Maine recently.

"We shall have no further need for strikes," he said. "We have no less than thirteen co-operative quarries in working order in Maine, and can successfully compete with the manufacturers in supplying granite. At the close of the strikes last summer we started these co-operative quarries, which soon ended the troubles. It is better than going to law or striking. Commisisoner of Public Works Adams of Brooklyn said he would help us, but that he was doubtful of our success. We convinced him that co-operative quarries were a success, and supplied 1,250,000 paving blocks in Brooklyn. It requires little capital. We turned out \$97,227 worth of work in five months, and the entire capital invested amounted to less than \$1,000. I am now preparing figures on the subject for the Bureau of Labor Statistics."

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No. 10
RED SWEDE

WM. C. TOWNSEND,

Manufacturer,
Exporter, Importer and Wholesale Dealer in

BUY
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IMPERIAL
BLUE PEARL

FOREIGN AND AMERICAN GRANITES,

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Granite Columns and
Pilasters for Archi-
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tractors.

POLISHED GRANITE COLUMNS,

of Red or Gray Granite.

—MANUFACTURED BY—

J. G. MOTT & Co., JOLIET, ILL.

Our Lathes turn out Columns of any dimensions not exceeding four feet in diameter and twenty feet in length.
Mention STONE when writing for prices.

MADISON PINK GRANITE

Quarried and Manufactured by

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Wholesalers in Granite and Statuary,

WANT YOUR ORDERS.

14 Cyclorama Place, INDIANAPOLIS, IND.

The sale last month of the Goodale marble quarries, situated in the north-west part of Massachusetts operated many years ago by Chester Goodale, grandfather of the well-known Goodale girls, is the subject of much speculation at the present time. The sale was made by Roscoe C. Taft, son-in-law of the late Chester Goodale, to George E. Hall of Cleveland, O., for \$9,000. The marble is of two colors, pure white, which is the larger yield, and a vein of blue of fine quality. The nearest point shipping this marble to market is Great Barrington, which is three miles away over a tolerably level highway. This cartage during the later years has been too expensive to work the quarry in competition with other quarries more favorably situated for railroad facilities. The idea of Mr. Hall, of Cleveland, stepping in and purchasing these works at this time is thought to have some connection with the later purchase of the New York and Massachusetts railroad by Russell Sage, this being more familiarly known as the H. D. Cone railroad. As the village of South Egremont is but a short distance from this quarry and any extension of this road eastward would have to pass through that village, it is surmised that Mr. Hall is on the inside in regard to the further extension of this railroad, a spur track from which into the Goodale quarries would enable their successful and profitable working after years of idleness.

A stone coffin weighing 1,500 pounds was completed here to-day for Stephen Langford, an eighty-year-old land owner of Madison County. He is in the best of health, but says he wishes to "preserve his body from polecats, minks, and other like animals."—*N. Y. Times*.

The McDonald Stone & Machine Co., New York City, writes as follows correcting an item in January STONE:

"We beg to call your attention to an error you have made in your January number, on page 166, regarding the purchase of granite property at Mt. Eve, Orange county, New York. The property referred to was undoubtedly the property which was purchased by this company last summer, and no person by the name of C. H. Stanton is identified with us in any capacity whatsoever. If you see fit you might correct the article mentioned. It is our purpose to open, develop and extensively equip our property at Mt. Eve, or as we term it Warwick, and to construct a railroad that will give us an outlet via other lines to New York, Philadelphia and western markets. We have also acquired at Mt. Lookout, Orange county, New York, a silica limestone, or black marble, quarry which will also be extensively equipped with saws, polishing and cutting machinery for manufacturing mantels, tiles etc., and for building stone. We own and have in full operation at Mason, N. H., a white granite quarry equipped with two McDonald stone-cutting machines, polishing machines, lathes, etc. We have contracts under way now, and partially completed, for putting this granite into the Home Life Insurance Building and the boiler house of the Metropolitan Museum of Art, this city. This company has only been incorporated a short time but later on we shall be glad to give you further particulars."

The granite firm of Wallace Hunter and John Dow, at Williamstown, Vt., has been dissolved. John Edwards succeeds Mr. Hunter in the new firm of Dow & Edwards.

The Cleveland Stone Co.

Largest Producers of Sandstone in the World.

Sole Owners of the Celebrated

BEREA, OHIO, QUARRIES

AND LARGEST OPERATORS OF THE GREAT

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BRIDGE-STONE.

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CORRESPONDENCE SOLICITED.

General Offices, CLEVELAND, OHIO.

THE MALONE STONE CO.,

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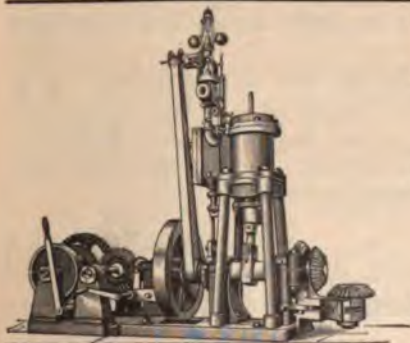
AMHERST, BLUE AND BUFF, EUCLID BLUE AND PORTAGE RED

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Stone Machinery and Cranes.

Electric Machinery a Specialty.

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BY A NEW PROCESS—CHEAPER AND MORE SATISFACTORY THAN DIAMOND DRILLING.

A Valuable Book for Every Business Man and Property Owner.

THE LAWS OF BUSINESS

FOR ALL THE STATES AND TERRITORIES OF THE UNION.

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Late Professor of Law in Harvard University, Cambridge, and author of Treatise on the Law of Contracts, on Mercantile Law, Etc., Etc.

This indispensable work contains information of the highest value to Business Men. It treats fully and clearly of

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IN BLOCK, SAWED AND FINISHED STOCK.

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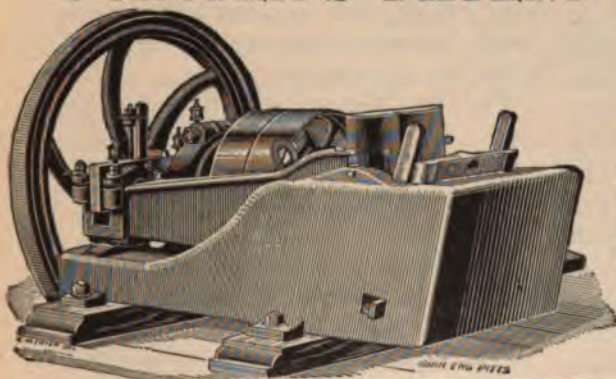
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STEPS AND PLATFORMS, LAVATORIES, PLUMBERS' SLATE WORK.

Hydenville, Vermont.

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The Chicago & Bedford Stone Co. own and operate the famous "Blue Hole" quarry, located in the northeastern part of Bedford, Ind. This quarry is one of the oldest and most famous sources of oolitic limestone in the country. The bluestone obtained from it has never been equalled elsewhere, and perhaps did more than anything else to establish the reputation of Bedford stone. It is the standard by which all other bluestone in the Indiana oolitic belt is graded. The "Imperial Blue" quarried by this company brings a higher price in the market than other oolitic stone, otherwise it could not be profitably produced, and is found under very heavy stripping.

Believing that it will cheapen the cost of turning out their unequalled article, the present members of the company have decided upon an innovation which will be watched with interest by both practical quarrymen and the owners of quarries. It is the introduction of the electric motor idea into their quarry. In the electric system power is produced by a large central engine, converted by means of a large dynamo into electrical energy and conveyed thence by means of wires and made available wherever needed, by electric motors.

By the present system of quarrying the derricks are operated by one engine; the saws (generally) by another; each channeler is a separate engine; each traveler is another; a separate boiler is necessary to operate the steam drills; and often small independent pumping engines and boilers are required. The result of so many boilers to feed and engines to look after is a very large consumption and unavoidable waste of fuel, and the employment of a great many men.

The plant is to a large extent new. An Atlas engine of 112 horse power, with necessary boilers, has been added. This will be connected by belting with the six new gangs of saws which are now in course of construction; and will also operate the seventy horse power Thomson-Houston electric motor. This motor will be connected by wires with the new traveler which the company is putting up, with the four channelers, and with the power-house in which the machinery for operating the derricks is located.

One instance is known in which a traveler was successfully operated by electricity, and it is thought possible that derricks have been worked by the same power, but these cases were in city stone or ship yards. No channeler was ever before run by electricity, nor a quarry anywhere else in the world operated by this system.

The big dynamo will be connected with a storage battery during the day, and the energy thus stored will be used for lighting the mill when a night force is employed.

The company expects to effect a big economy in fuel and a considerable reduction in the number of men employed, by the electric system—or rather, they expect to accomplish greater results with the same force of men and expenditure of money.—*Bedford Mail*.

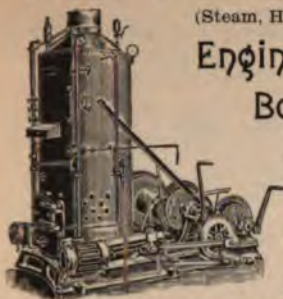
INCREASING FACILITIES.

Perry, Matthews & Buskirk, of Bedford, Ind., have recently added to their equipment two channelers and have two more ordered, also a full line of machinery to open up a new drift just east of their old quarry. They are shipping stone at the rate of ten to twelve carloads a day. The additional facilities will put them in excellent shape to take care of any demand.

HOISTING MACHINERY,

(Steam, Horse and Hand Power.)

**Engines,
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HOISTING ENGINES of any power or style, SINGLE AND DOUBLE CYLINDER, with improved patent friction drums especially adapted for all classes of work. Single and Double Drum, friction and direct geared, link motion Mining Engines. Four, six and eight spool, lock clutch, self-propelling BRIDGE ERECTING Engines.

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Gentlemen: We are running 33 gangs with your sand feed, and see no reason to change our opinion as to the superiority of your machines. They will pay the entire expense of putting them in this season.

Yours truly, THE CLEVELAND STONE CO.

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If you want a Granite that possesses all the desirable qualities for Monumental purposes

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MARIETTA,

xviii

GEORGIA.

H—Stone.

NEW ENGLAND NEWS AND NOTES.

The Webb Granite & Construction Company, Worcester, Mass., has been awarded the contract for furnishing the city of Springfield with 10,000 square yards of paving blocks at \$1.60. The only other bidder was the Hudson River Granite Company, at \$1.62.

The committee which was appointed by the quarry owners in Portland, Conn., to confer with the striking employes has agreed upon a scale of wages and the men will go to work at the regular summer rate, of which the highest pay is \$2.50 a day.

The Excelsior Granite Company, of Montpelier, Vt., are just now completing a novel piece, the chief attraction of which is a polished sphere, five feet in diameter. One would easily be deceived in estimating its weight; he would scarcely conceive that a symmetrical ball could weigh ten tons, but such is the case. If you don't believe it figure out, allowing 180 pounds for a cubic foot of granite, for that is the scale.

The Augusta Granite Company that is working the Fuller quarry on Oliver's Ledge, near Augusta, Me., starts with a crew of 75 men and a weekly pay-roll of over \$1,200.

The Monson (Me.) slate quarries that have been running on short time through the winter months began March 8 on ten hours a day, with a favorable outlook for a busy season ahead.

There is a strong probability that Buckley & McCormick, of Malden, Mass., will move their granite-cutting business

to Enfield, Mass., this spring and work from 20 to 30 men, using the granite from Tilton's quarry which they have bargained for. The Business Men's Association has guaranteed to erect suitable sheds and derricks for them beside the B. & M. railroad tracks.

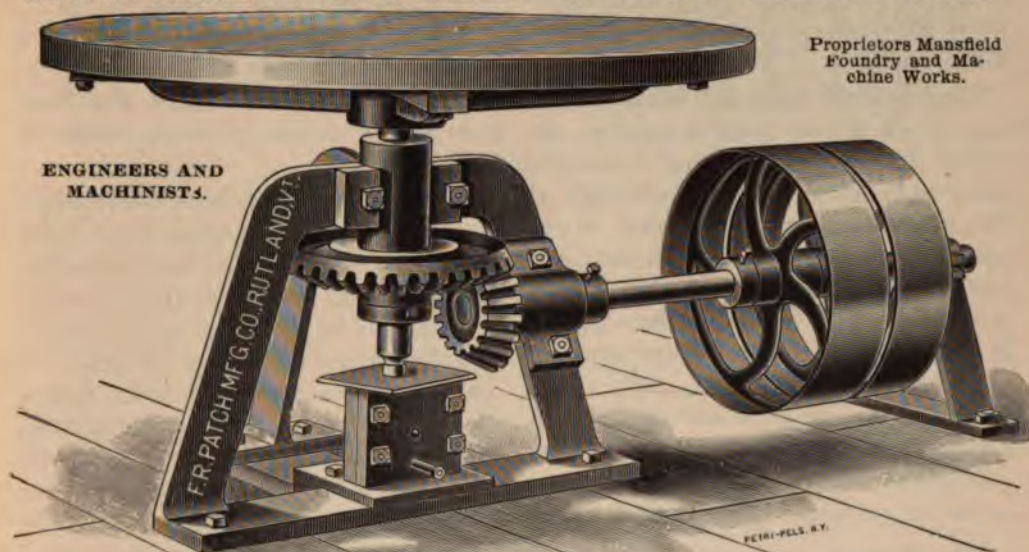
Work was opened very encouragingly at the sheds of the Merrimack Valley Granite Company, Concord, N. H. A good sized force of men is now employed and there is sufficient work contracted for in advance to keep them engaged for at least two months to come.

The Moir Granite Company, of Montpelier, Vt., has erected another granite shed.

There is some anxiety among Rutland, Vt., granite and marble dealers and cutters over the prospect of a strike, especially among the granite quarrymen at Barre, the center of trade. If it takes place it will cause heavy damage to all concerned, as rough stock is very scarce, and all the granite firms have made large contracts for summer work, which would give employment to more men than in any former year. Several large stone shops are being erected, and prospects are bright for the year, but if trouble occurs there will be another set-back to the already damaged business. The men demand that the Quarrymen's Union be recognized by the dealers.

W. C. Dalton and L. M. Rushford have formed again the partnership dissolved some time since by them, and will continue their granite works on King street, Northampton, Mass., moving there from

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Armory street. Mr. Rushford is recovering from the severe injuries received some time ago and expects to resume work soon.

The rumored strike at Barre (Vt.) to take place at the granite quarries recently, did not begin, and it is thought there will be no trouble until May 1. The quarrymen say if the dealers do not ask them to return to the ten-hour system there will be no trouble, but if such demand is made there will be a strike. It is thought the quarrymen are seeking to get even with the granite cutters who refused to support them in 1891. Should the quarrymen strike it will cause over a thousand cutters to remain idle, owing to having no rough stock to work.

The Hudson & Chester Granite Company, of Springfield, Mass., has presented a price list to the officers of the Granite Cutters' Union at Chester, and there is considerable dissatisfaction expressed among the cutters, as they say that it will reduce their wages about twenty per cent on piece-work. They expect that the men who are rapid cutters will be put on day-work, while the others who cannot cut as much or as fine a class of work will have to cut by the piece. This would give the company a decided advantage over the present price list that expires May 1. The new bill is almost identical with the one accepted for a term of five years at Barre, Vt., but there is very material difference in the granites. The cutters say that Barre granite cuts a third easier than Chester, owing to the fact that it is a more open and cross-grained stone. The union will also draw up a bill of prices. The outlook at present is that there will be a strike about May 1.

The Gooch & Haines granite quarry, Biddeford, Me., which has been idle for more than a year, was sold to Emmons

& Ricker, a Biddeford granite firm, who will begin operations at once.

Kittredge & Stevens, one of the heaviest granite companies in Milford, N. H., have dissolved partnership. The business is to be carried on in the future by E. G. Kittredge.

The Redstone quarries at Manchester, N. H., are busy places these days. With several large contracts on hand, including the Boston & Maine station at Lowell, a large public building at Baltimore, and three miles of curbing for streets in Cincinnati, the superintendents find it close work to keep them all moving. The company also has the contract for the New York Grant monument, but owing to the press of work here the stone for it will be cut from their quarry in North Jay, Me.

Mt. Waldo Granite Company at Prospect, Me., is getting out the granite for the New York Armory building, employing about 100 men.

A special to the *Courier-Gazette* from Clark's Island, Me., says that it is reported that the Clark's Island Granite Company of that place has consolidated with the Bodwell Granite Company, and that John Blethen, of Spruce Head, will take charge of the work there. Spruce Head is a very busy granite-cutting place at present, and there is talk of a big building job.

The Middlesex Quarry Company, of Middletown, Conn., is laying a track through their yards, which will connect with the Brainerd quarry track. When completed this company will be able to load on to cars at the pit and transfer to the Air Line road. Heretofore they have been compelled to cart the stone quite a distance and load on to the cars at the Brainerd crane. This change will enable them to ship stone at a very much less cost.

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Canada; 830 Apartado, Mexico City.

The S. E. and H. L. Shepherd Company has been organized at Rockport, Me., for the purpose of manufacturing lime and doing a general mercantile business, with \$100,000 capital stock, of which all is paid in. The officers are: President, S. E. Shepperd of Rockport, Me.; Treasurer, C. E. McIntire of Rockport, Me. Certificate approved Dec. 30, 1892.

The output of Rockland, Maine, lime kilns in 1892 is estimated at 1,400,000 barrels, which amount is considerably in excess of the average production of the 10 years last past. The returns have not been entirely satisfactory, however, 85 cents a barrel for common and 95 cents for extra lump having been the ruling prices, and these are rather low figures. The companies, by proper co-operation, might have made the price 5 cents a barrel higher, which would have made a difference of \$70,000 in the total receipts. It is thought that the manufacturers will stand together in 1893 and maintain prices at a fair figure. Fifteen kilns are now in operation, and as the New York market is practically bare of lime, other kilns will soon be started up.

The Co-operative Granite Manufacturing and Building Company of Montpelier, Vt., have already received applications for erecting between 75 and 100 houses during the coming season in Montpelier and Barre. The company are to appoint agents in Burlington, Rutland, St. Albans, Bellows Falls and other towns, with the purpose of extending their building projects to all parts of the state.

The New Brunswick and Maine Granite Works building at Calais, Maine, is nearly completed. The main building is 220 feet long and 51 feet wide.

The boiler house is 24 feet long and 51 feet wide. The company, in which E. R. Burgee, Esq., of Bangor, is prominently interested will commence operations about the first of March and when in running order will employ about 250 men, with a pay-roll of \$500 a day.

The Stony Creek, (Conn.) quarry strike has been declared off. It began last May, has cost over \$200,000, has caused the property in the vicinity to depreciate over 40 per cent and compelled the quarry owners to throw up contracts amounting to \$500,000.

The third annual meeting of the Connecticut Granite Manufacturers' Association was held in New Haven, Conn., Feb. 7. The officers elected for the ensuing year are as follows: President, John Beattie of Leete's Island; vice presidents, T. F. Jackson, Waterbury; E. Mower, Roxbury Station; John Voorhees, Greenwich; Thomas Corey, Groton; C. P. Davis, Niantic; William Booth, New London; treasurer, C. S. Johnson, Millstone Point; secretary, J. F. Salter, New London. Each vice-president represents one of the six districts into which the state is divided and has jurisdiction over his section. The secretary reported that all the manufacturers except those at Stony Creek and Roxbury Station had settled the difficulty with their workmen.

Mrs. Charles A. Haines has sold the Gooch & Haines granite quarry, Biddeford, Me., to Messrs. Gowen Emmons and Charles Ricker, who are owners of a Pool street quarry. Mrs. Haines's quarry has been idle ever since the death of Mr. Gooch. The new proprietors will begin operations there at once.

William Carnes, of Montpelier, Vt., has purchased three acres of quarry land of H. I. Cheney and is to open a quarry.

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Mr. Joseph Arche's quarry, at Hallowell, Me., has passed into the hands of a stock company, a part of whom are connected with the Friendship Company. They will commence operations about the middle of this month with a small crew of men, increasing their force as business may warrant in the spring. There is a rumor afloat, which may have no foundation—that Mr. Geo. F. Bodwell, of Chicago, will open up and operate his claim at Hallowell, Me., in the spring; that he has formed a stock company with a capital of \$100,000, and means business not only for himself and company, but for Hallowell.

The total shipment of cut granite from Milford, Mass., the past year was 9,563 tons, as compared with 27,864 tons in 1891 and 22,000 in 1890. The smallest shipment was 412 tons in March, and the largest 1,489 in August. The estimated amount of money paid out in wages in 1891 was upwards of \$600,000, and on a proportionate basis that paid out in the year just ended was only about \$200,000, a clear decrease of \$400,000 in wages from that of 1891. While the failure of the Darling Bros. affected the total somewhat, the principal cause of the decline can be attributed to the differences existing between employer and employed, which all hope may soon be terminated.

The Bradford Granite company, Concord, N. H., has increased its capital stock from \$1,150 to \$1,750.

The Quincy, (Mass.), Curbing and Edgestone Company have elected these officers: President, E. F. Carr; Secretary and Treasurer, F. L. Badger; Superintendent, W. T. Shea; Directors, E. F. Carr, John Cashman, G. H. Hitchcock, J. H. Elcock; P. T. Fallon, W. F. Fegan, Leander Matthews, J. Q. A.

Field, W. T. Shea, Marshall Wright, F. J. Fuller.

The Vinalhaven, (Me.) Co-operative Granite Company expects to supply stone for the new public building at Camden.

Out of town capitalists have leased John L. Osgood granite quarry on Stark's Hill, Fryeburg, Me., and work will begin in the spring in opening and developing it. This granite is pink, like the granite quarried at Redstone, N. H., but is of rather coarser grain. It is susceptible of a fine polish and is easily worked. This quarry ought to become a flourishing industry in Fryeburg.

The annual meeting of the Rutland White Marble Company, Worcester, Mass., was held recently in the company's office, in the Burnside building. The old board of officers and directors was re-elected as follows: President, C. H. Fitch, Treasurer, A. L. Burbank; Secretary, C. H. Marble of Rutland; Directors, J. W. Howe, C. H. Fitch, A. L. Burbank, H. T. Buck, M. H. Murphy, C. H. Marble.

The firm of Fernald & Mudgett, marble and granite workers, Belfast, Me., has been dissolved by the retirement of Mr. A. L. Mudgett. Mr. James F. Fernald is to continue the business at the old stand on Pleasant street.

The French Pond granite quarries are getting quite an amount of attention, and the idea of bringing the granite to Woodsville, N. H., for cutting is a tempting possibility which the people are hopefully considering. There is little question but that a railroad can be built from Woodsville to the ledges with as little difficulty as from any other point, and to locate the cutting sheds there would be of great advantage in many ways.

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A block of granite containing 360 cubic feet, weighing about 35 tons, has been brought from the quarries and unloaded on the site of the old Wells & Lamson sheds, at Barre, Vt. Messrs. Forsyth & Ingham are to make the stone into the first die for the Minnesota state soldiers' monument at Gettysburg. This is the largest die ever brought from the quarries. It is estimated that the whole monument when completed will weigh over 150 tons with statue, and occupy 15 cars for shipment. They have also contracted to build a larger monument for other parties.

At a meeting of the Granite Cutters' Union recently, at New Bedford, Mass., a schedule of prices for the year commencing May 1 was adopted. The men will work 53 hours per week, 9 hours daily, with the exception of Saturday, when they will work 8 hours, for 34 cents per hour or \$18.02 per week.

C. T. Barber, of Southbridge, Mass., is now located at Providence, and is meeting with good success in selling the treasury stock of the Deslauriers Slate Co.

Samuel Henry, an employe of the Freestone Quarry Company at Cromwell, Conn., was almost instantly killed by a blast in the quarry. A splinter of flying rock entered his mouth, and came out through the top of his head. He lived but an hour and a-half. He leaves a family.

The Connecticut Brownstone quarry of Cromwell has continued work during the winter with the exception of a few days when they were obliged to suspend on account of the extreme cold weather. The entire force of men have been given employment preparing for spring shipment. The company will build a large stone saw-mill next summer.

Messrs. Barber and Thompson of Niantic, R. I., have re-opened the quarry at Hopkinton, R. I. The quarry is just across the river from Westerly.

The stockholders of the True Blue Marble Company held their annual meeting in Rutland recently. The officers' reports of the company's business were encouraging. The following directors were elected: J. W. Cramton, G. E. Royce, B. F. Pollard, D. C. Pollard, A. Wurtzburg, Frank Huntress, G. B. Royce. At the close of the stockholders' meeting the new board of directors met, organized and elected the following officers: President, J. W. Cramton; treasurer, G. E. Royce; secretary, G. B. Royce; auditors, D. C. and B. F. Pollard. By the unanimous vote of the directors George C. Underhill was made superintendent.

Charles C. Doe has been chosen one of the directors of the Black Mountain Granite Company. Their quarry is located in Piermont, N. H. This company is incorporated under the laws of Vermont with an authorized capital of \$100,000 and a paid in capital of \$50,000.

Wm. Crombie of Ayer, Mass., has sold his marble business to Messrs. O'Toole and Allen of Clinton.

Fire recently damaged the engine house in quarry No. 2 of the Cobb Lime Co., at Rockland, Me., damaging the engine and pump. Loss, \$1,500; insured.

The slate mill at Castleton, Vt., is again in operation after a season of repairs.

James V. Luce, of Niantic, Ct., has been awarded the contract for furnishing stone at Vineyard Haven for the government work in progress there. The money value of the contract is about \$5,000.

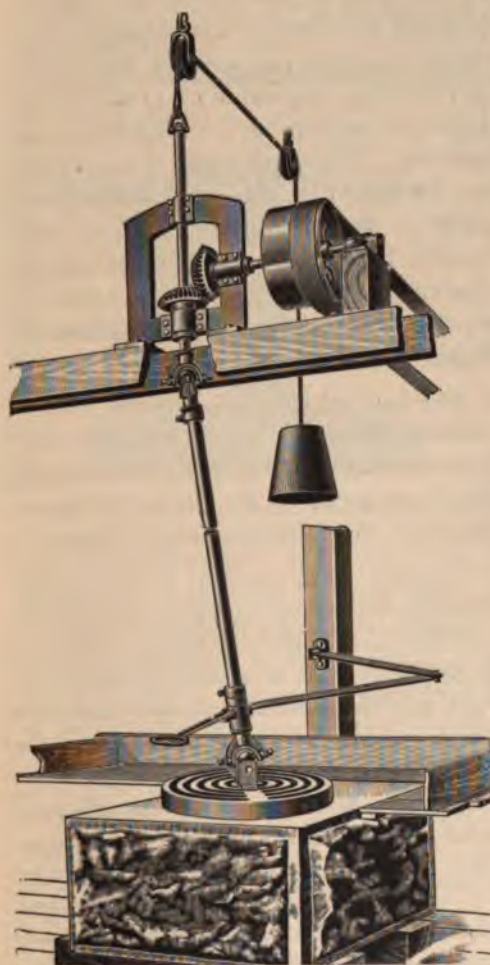
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Vol. V.

(June, 1892, to November, 1892)

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CHICAGO, - - ILL.

MONUMENTAL NOTES.

The Maine and New Hampshire quarry at North Jay, Me., is furnishing the granite for the soldiers' and sailors' monument to be raised at Athens, which will be thirty five feet high. The company now employs seventy-five men in the yard and one hundred and fifty in the quarry. It will take them three years more to finish taking out material for General Grant's tomb, for which they have the contract.

A carload of Barre granite, weight 20,000, composing three monuments of the exhibit of the R. C. Bowers Granite Company at the World's Fair, was shipped recently.

It has been recently asserted that the Baxendale (Mont.) granite was not suited for monumental work. While this statement has been to an extent true, the development of 1892 has uncovered an extensive body of granite as well suited for every class of cemetery work as any produced in America. To afford practical demonstrations of this fact, Mr. Harrison has designed and cut a large monument from this granite during the past winter, weighing nearly 30,000 pounds. With a fair amount of local patronage for general cemetery work, an impetus may be afforded for the establishment at this point of a monumental works that will command a share of the trade in states west of Wisconsin, which now draw their supply from New England.

The Fletcher & Co. (of St. Albans, Vt.) granite works have orders ahead for three months' work and is continually adding

to the force of men which will shortly number over forty. Considerable difficulty has been experienced this winter in receiving shipments of granite from Barre, on account of the severity of the weather. For retail trade the company has about thirty handsome finished designs of monumental work. This part of the business has developed rapidly during the past six months. It also has an excellent western trade, the shipments being quite frequent of late.

The base of the Maisonneuve monument at Montreal is to be made of red New Brunswick granite and the contract has been given to Mr. Robert Reid, of Moncton, N. B., for the sum of \$5,200.

Another monument to be sent to the World's Fair has just been finished in the Vermont Marble Company's shop at Procter, Vt. It is made of mountain dark marble, and is nine feet high, the bottom base measuring three feet six inches square. There is a bottom base, base, die and dome-shaped cap trimmed with leaf ornaments on the four corners. The marble is a very beautiful piece of its kind, and the finish of it brings out the handsome shadings to the best advantage. It is from an original design of George N. Keefe.

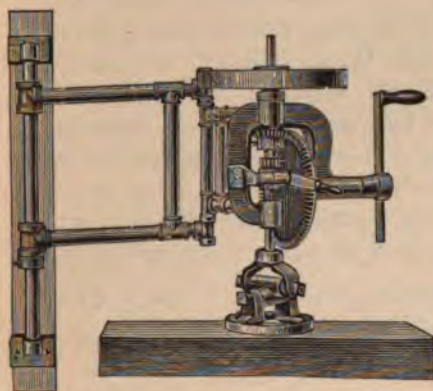
The T. A. Jones & Jewell Co., Bangor, Me., have contracted to build for one of the most prominent Bangor families a granite monument to be erected at Mt. Hope, the stone used to be from the Hallowell quarry and the design of sar-

THE N. C. HINSDALE'S SONS GRANITE CO.,
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The eight States traversed by the 6150 miles of the **Chicago, Milwaukee & St. Paul Railway** tracks (Illinois, Wisconsin, Northern Michigan, Iowa, Missouri, Minnesota, South Dakota, and North Dakota), possess in addition to the advantages of raw material that which is a prime factor in the industrial success of a territory—a people who form one live and thriving community of business men in whose midst it is safe and profitable to settle. Many towns on the line are prepared to treat very favorably with manufacturers who would locate in their vicinity.

In addition to its vast agricultural resources, its territory comprises forests of hard and soft woods, mines of iron and other metals, coal and other minerals, quarries, clays of all kinds, tan-bark, flax and other raw materials. Water-powers, (both river and artesian) are also available.

QUARRY interests on the line are being rapidly developed and there are a number of places where SEWER PIPE works would command a great market for their product.

A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines.

The central positions of the states traversed by the Chicago, Milwaukee & St. Paul Railway makes it possible to command all the markets of the United States. Nothing should be permitted to delay enterprising manufacturers from investigating. The Industrial Department promptly furnishes practical information to manufacturers. As it is to the interest of the road to secure the location of industries at places where the surroundings will insure their permanent success, the information furnished a particular industry is pertinent and reliable.

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cophagi pattern. This work will be the heaviest ever done here, the monument alone weighing over twenty-five tons.

A company is laying out a new cemetery at Roanoke, Va., to be known as the Riverside cemetery. It is a beautiful spot, and on the summit will be erected to the Confederate soldiers a monument thirty feet high, ten feet square at the base and two feet in diameter at the top. It will be constructed of "noir boulders," and cost \$2,500.

The Wetmore & Morse Granite Company, Montpelier, Vt., have the \$35,000 Ellis mausoleum nearly ready for shipment to the Forest Home cemetery at Milwaukee. It will require twenty cars for transportation. They are also making another \$10,000 mausoleum for the same city, and a \$12,000 one for Woodlawn cemetery in New York. Two large

granite entrances for a park at St. Louis, valued at \$15,000 and a spire three feet, seven inches square and forty feet long for Buffalo, N. Y., are being constructed. They now have fifty-five men at the works and thirty-five at the quarries.

The Barre, Vt., Granite Co., have received the intelligence that three times the original space has been assigned them at the World's Fair.

A. S. Webster has formed a partnership with W. H. Hill, and the new firm of Hill & Webster, Woodsville, N. H., are making arrangements to vigorously push the marble and granite business. They will enlarge the present shop by building a thirty foot addition, which will give them some much needed room.

Stamford, Conn., is to have a \$20,000 soldiers' monument.

BIG STONE QUARRY.

D. Rynerson, H. G. Luker and A. L. Headrick have formed a partnership for the purpose of working a quarry at Pioneer, Lincoln county, Oregon. The name of the company will be the Pioneer Stone Company. The stone is a gray sandstone and is considered by experts as one of the finest stones on the coast. It has been tested by chemical test and has stood when other sandstones, considered good, have dissolved in two hours. It has also resisted a greater pressure than any stone yet found on the coast. There is a whole mountain of this stone, and the supply is practically inexhaustible. In order to get this stone to market, a spur will be run from the Oregon Pacific railroad, which is only eighty rods from the quarry. Until this track is in, the stone will be hauled to the railroad by means of heavy wagons and teams.—*Salem Independent*.

THE BEDFORD, IND., BELT ROAD.

The Bedford Belt Road Company is strengthening its hold at the Bedford stone quarries, already having reached a number of the quarries which are open, and is now building to reach quarries to be opened and operated on an extensive scale. To each one of these quarries the company is building a trestle ninety feet high and nearly eight hundred feet long. The Belt company has purchased four fifty-one-ton engines and contracted for another, and is now delivering stone from the quarries to the Evansville & Richmond road, which, in turn, delivers it to the Pennsylvania lines at Seymour, and to the Big Four at Westport. Stone is now being shipped from the Bedford quarries to Cincinnati, Philadelphia and New York. The front of the New York *Mai. and Express* building is built entirely with Bedford stone, and it is proving a very valuable advertisement for the oolitic quarries in Indiana.



FROM THE ENGRAVER AND PRINTER, A MONTHLY MAGAZINE OF PROGRESS IN ILLUSTRATIONS.

ECHO BRIDGE, NEWTON UPPER FALLS, MASS.

This bridge carries the Sudbury River Aqueduct of the Boston water supply. It was built in 1877. The great arch spanning the Charles River is the seventh largest arch in the world, having a span of one hundred and thirty feet. There are in all seven arches, with a total length of four hundred and seventy-five feet. This bridge is noted for the echoes, which may be heard when standing beneath the arch, a single sound being repeated as many as eight different times.

STONE

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THE CHATEAUX OF FRANCE—IV.

THE donjon of Chateau Galliard is of interest to the student of architectural history, because it was the first in which the wooden hound was replaced by stone machicoulis, although here the machicoulis does not appear in the more perfect form which was developed later. In other respects this donjon is not of so great interest as that of many other chateaux. Fig. 8 in last month's article shows this donjon at M. It is also readily seen in fig. 3, this article. Fig. 1 is a plan of the second story, the first being a sort of cellar, without windows, reached only from the upper floors and used for the storage of provisions and probably as prisons. It is often very difficult to prove the existence of such prisons, although there still remains in many donjons undoubted evidences of prison cells, places which the prisoner never left after having once entered. The side B of this donjon was opposite the chateau gate (fig. 8 last month) and enfiladed it. The point A was built to strengthen the donjon at its most vulnerable part, and also to force the assailant to expose himself more to the projectiles of the garrison than would be the case were the donjon cylindrical. P is the postern or entrance door, which was approached by a steep staircase. The two other openings shown are windows which open towards the escarpment D, on which side the donjon was so inaccessible that Richard, its builder, did not think it necessary to protect it by machicoulis.

Fig. 2 shows the exterior of the donjon. The steep stairway leading to the postern is seen, protected on the right by the loophole through which arrows were shot at those ascending, and by the stone machicoulis above. These machicoulis are well arranged, being arches carried on piers which

B—Stone.

are wider at the bottom than at the top. Thus projectiles thrown through the opening at the top spread in the descent and covered the entire space at the bottom of the wall. The slope of the lower part of the donjon, as was always the case, was well considered by its constructor. Upon it and the projection of the machicoulis depended the rebound of the projectile and the amount of ground covered by it.

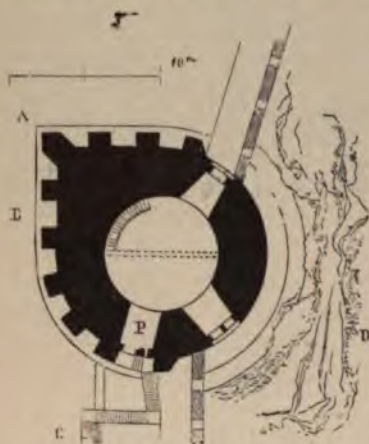


FIG. 1.

must be considerable in order that projectiles could be made to cover as much as possible of the bottom of the moat. A heavy stone would describe the line I K; one still heavier would strike the moat to the left of K, while one of less weight would strike nearer the point H. Thus the enemy would find it difficult to place scaling ladders. Walls the height of B were in little or no danger from scaling, but it was important to cover the bottom of the moat close to the foot of the wall in order to hinder the miner from attaching himself. Thus the slope of the talus was less and the projectile fell close to the foot. C represents a wall of greater height, placed opposite a high counterscarp. This made it necessary that the projectile should skim the entire length of the wall and the slope of the talus was consequently less. D differs from the other walls in being built on an escarpment and the projectile must fall directly at the foot as shown escaping the natural projection of the rocky foundation. Thus we see the importance of having walls whose height corresponded with the slope of the talus, and also of

Fig. 4 illustrates this point. A, B, C and D represent walls of differing heights. The stone projections outlined at the top are the machicoulis, in the bottom of which there were holes through which stones or other projectiles, or even boiling oil, were thrown on the unfortunate enemy standing at the bottom of the wall. G is the bottom of the moat. Attempts would be made to scale a low wall such as A, and the slope of the talus



FIG. 2.

having projectiles of a known weight, that they might strike a given point. Later these projectiles were usually cut in spherical form from stone during times of peace and stored away until needed.

The donjon had four stories above the basement—the one level with the postern; the one above, which was on a level with the machicoulis and the chemin de ronde, which was protected with battlements; a third in the cupola, which had no windows and was used to store ammunition; and a fourth which was under roof, but also provided with battlements.

This donjon had the fault of all those of its time, a fault which belonged also to the Roman fortress. Its entrance was above the ground level, and the garrison could descend only one or two men at a time. The arrangement had its advantages when the greatest danger was from treachery or surprise. An entrance above the ground level which was only reached by a ladder drawn in after the garrison had entered had its utility in earlier times. Now that better trained troops were employed, the methods of warfare changed somewhat, and it often became necessary that the garrison leave the donjon hastily. After Philip Augustus took Chateau Galliard he realized this, and in building the Louvre at Paris, placed the entrance on the ground floor.

Before considering *hourds* and machicoulis, it may be interesting to take up the siege of this chateau, which was so long considered impregnable. The long and interesting description of this siege comes to us from an eye witness, the French king's chaplain. During the life of Richard the Lion Hearted, Philip did not dare attempt a siege of the chateau, but after it fell into the hands of John the Landless, it came to the French king's ears that the defenses were neglected and the garrison small. He immediately marched upon it, found the peninsular of Bernieres unoccupied (see fig. 7, article of last month), the few Norman troops who had been stationed there having fled to the chatelet on the island in the river, after having broken the bridge which connected the two banks of the river with the chatelet.

Philip Augustus established his camp opposite the chateau, his right at Bernieres and his left at Tolni, joining the two camps by a line of circumvallation *K L*, traces of which still remain. He next anchored the flat boats which he had used for the transportation of stores and ammunition, in a straight line across the river, further securing them by cords attached to posts driven into the river bed. From one boat to another he built bridges, completely spanning the stream. He then built two wooden towers upon four of these boats in order to protect the river and give a point of attack against the chatelet. John attempted to secure the place, sending a Norman fleet and a land force who were to act simultaneously. But the fleet was delayed, and the land soldiers being unable to rout the French alone,

retired before the arrival of the fleet. The fleet finding itself unable to destroy the towers which the French had built in the river, also retired with great loss.

The next move of the French was on the chatelet. William the Breton, says that a very skillful swimmer, a certain Galbert, filled vases with hot coals, closed them and so skillfully sealed the outside that it was impossible for the water to penetrate them. These he attached by a cord to his waist and swam to the chatelet where he set fire, on the chateau side, to the wooden palisades surrounding it. He was not discovered at this work because the garrison expected no attack from this side and were not guarding it. The soldiers in the chatelet fled from the flames to the chateau and Philip took possession of both it and the village of Petit Andelys, established in the former a picked garrison and repaired the fortifications.

The inhabitants of the villages of Andelys and Petit Andelys took refuge in the chateau carrying their



FIG. 3.

household goods with them. They were lodged in the outer court in temporary structures.

The French king now turned his attention to the reduction of the chateau. William the Breton says: "The chateau had nothing to fear from a siege, both on account of its ramparts and because it was surrounded by deep valleys, peaked rocks, and hills whose slopes were steep and covered with stones. Had there been no fortification, its very position would have been adequate defense. The king judging that all his engines of war would not reduce the walls, anxiously sought means by which he, at no matter what trouble or expense, could take this nest of which Normandy was so proud."

He dug a double trench through both hill and valley, completely inclosing his camp and protecting it from assault. There he sat down to starve

out those within the chateau walls. During the whole of the winter of 1203 and 1204 he waited. At the end of this time the commander of the chateau, Roger de Lascy, finding that his provisions were rapidly diminishing, turned out into the moats all the inhabitants of the villages, where they died of cold. It is said twelve hundred of these miserable people perished in the moats. However, there were enough provisions to last the garrison for a year. When the French king learned this, he grew impatient and began the active operations of a regular siege. By leveling the tops of the hills and filling the valleys with debris and the trunks of trees, he made a road over which his forces could advance to the chateau. He built engines—mangonels and pierriers—on the spot, and directed them against the chateau. The point of attack was the tower A shown, in fig. 8, last month's article. The soldiers carry stones, turf, tree trunks to fill the moat; they build a palisade behind which to shelter themselves; they construct high towers or *beffrois* from which the arches command the battle-

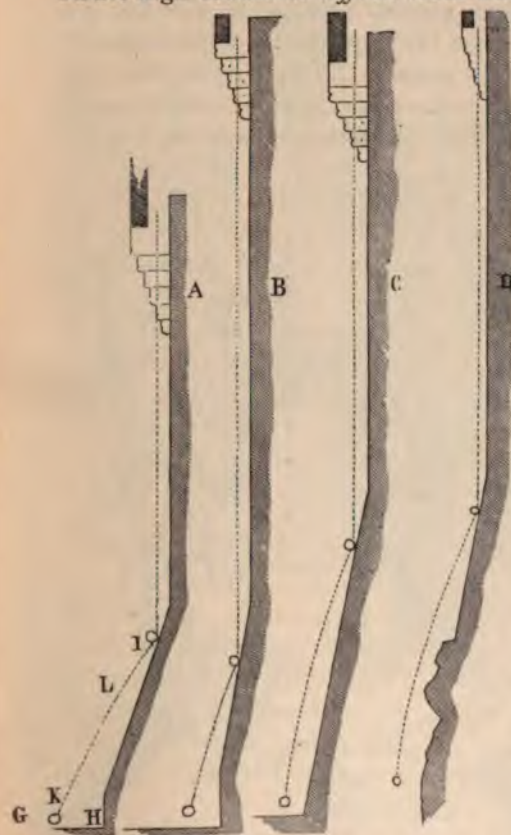


FIG. 4.

ments of the walls, wounding those who show themselves at the openings. When the moat is filled, the soldiers seize the ladders, plant them against the rock on which the tower A is built and attempt to reach the masonry above (see fig. 3). But their longest ladders will not reach, and with their swords they dig holes in the rock in which to place their hands and feet and climb to the masonry. Here they dig a cave, propping the wall with tree trunks. When all is in readiness they pile all sorts of combustibles about the props, set them on fire and retire to a place of safety. The wall of the tower falls, and the French forces rush in. The Normans retire from this advance work to the main court of the chateau, which was entirely separate from the other fortifications, as will be seen both in fig. 8, April number, and fig. 3 this article.

Philip now found himself obliged to begin another siege, to which he

proceeded. The engines were moved forward, and the place surrounded, and active operations began anew. John, with great lack of foresight, had built him a house overlooking the country, on the side towards the Seine. This was discovered by one of the French soldiers who, with several companions, crept along the bottom of the moat and succeeded in entering the first floor of the house, which was situated in the lower court. It is marked FE on the general plan. The Normans fearing a general attack set fire to the house and other structures in this lower court and retired to the donjon court through the gate K. The French soldiers took refuge in the storage caves, which are shown on general plan, until the fire was over, when they opened the exterior gate to the army outside. The French then proceeded to mine under the walls within which



FIG. 5.

the Normans were waiting, but the latter countermined and met the enemies half way. While the battle was raging, the French launched heavy blocks of stone against the wall from a catapult. The mine had so weakened this wall that it was unable to withstand the shock and fell. The enemy rushed in, and before the garrison had time to inclose itself in the donjon, they were overpowered, and Chateau Galliard became French property.

Had the entrance to the donjon been on the ground level, the garrison would have had time to take refuge therein, and a third siege would have been necessary before the place fell. As said, Philip Augustus took a lesson from this siege and built the donjon of the first Louvre with the entrance door on the ground level.



FIG. 6

The French king repaired Chateau Galliard and modified certain portions of the defense. In 1449 the chateau was again besieged by the English king, Charles VII, and the garrison forced to capitulate through want of provisions. At this time artillery was used, but ineffectually. The situation of the chateau on the rocks made it almost impossible to train the guns.



FIG. 7.

We shall give one more example of the ancient feudal chateau, whose distinguishing feature was the strong wall surrounding either a single or double court, within which was the isolated donjon. In the early period this structure was in the middle of the inner court; later, it was connected with the outer wall with a secret passage to the country. The other buildings were located without definite plan within the walls. This general arrangement was adhered to through the reign of Philip Augustus. During the time of his successor, Saint Louis, political changes worked important modifications in the military architecture.

As will be seen from an examination of the floor plan of the chateau of Courcy, fig. 5, there was more of unity in its conception than in any which we have given. The buildings, while having no connection with the donjon which is still distinctively feudal in character, are united by a thought of utility and convenience. They are not an aggregation of semi-temporary structures placed by hazard. The kitchens and similar parts are so placed that the inhabitants of the chateau may live with something of convenience. The soldiers no longer lodge in inconvenient places—under stairs, in corners of towers—but have well-regulated chambers assigned to them. These chambers, moreover, are all placed in one part of the chateau court.

In fact the entire arrangement of the chateau shows that it was planned

by a master and executed rapidly. It was built between 1225 and 1230, by the Sire de Courcy, one of the most powerful vassals of Philip Augustus. In fact Enguerrand I, Sire de Courcy, was so nearly an independent sovereign, so powerful and wealthy, as to be a large-sized thorn in the side of the king, whom he most distinctly rivaled. When Philip Augustus began the Louvre, Enguerrand swore to build a chateau which should eclipse that of the king both in size and splendor. In this he no doubt succeeded, though we have so few records of the first Louvre that adequate comparison is impossible. Philip was spared the humiliation of seeing his architectural effort outdone by his subject, as he died before either it or the Louvre were completed. As will be seen from figs. 6 and 7, the first of which is a bird's-eye view of the place, and the second a view of the interior court, the place is colossal. In fact it seems to have been built for a race of giants. It is difficult to realize how men of ordinary size could have occupied the place with comfort. The very treads to the stairs are of most unusual size.

The chateau was built on a large, irregular plateau about three hundred feet above the surrounding valley, which contained the towns of Noyon and Chauny. The approaches were steep and irregular, making it difficult to reach the place. It was a typical situation for a French chateau. As will be seen from fig. 6, the donjon was colossal, overlooking the entire group of buildings. The walls surrounding the court and inclosed buildings were protected at the corners by immense towers. The kitchens were located at L; at M were three stories of sleeping apartments; at N large magazines; at G the chapel. Another chapel was located at A outside the walls. This structure was probably older than the chateau proper. Figs. 5 and 6 show the three sets of drawbridges which protected the entrance. Further description of the general plan is unnecessary. The reader will recognize the arrangements for defense from a study of the illustrations.

Fig. 7 is the interior court with the chapel to the right; back of it the donjon, and at the rear, on the left, the entrance.

Viollet le Duc says that the donjon of Courcy was "the most beautiful military construction of the middle ages." We shall give several illustrations of this tremendous structure in the next article, and also describe the construction of *hourds* and *machicoulis*.

Louis H. Gibson.



NATURAL CURIOSITIES IN SOUTH DAKOTA.

THEY have a species of stone out in South Dakota that might possibly be utilized as fuel if the coal supply runs short. The stone pile alluded to is known as the burning bluff. Situated on a stream tributary to the Missouri in the southern portion of Charles Mix county, is this remarkable bluff. It was noticed for many years that snow would not remain on this hill, nor would the stream at the base freeze in the coldest weather. The Indians and the very early settlers, who quite generally imbibed many Indian superstitions, attributed this to other than natural causes.

One winter morning in 1888 a settler in the neighborhood of the bluff on looking out of his cabin door for the first time that day, saw smoke arising from the bluff and proceeded to investigate. Seeing no opening, and thoroughly puzzled, he dug into the bluff, and on drawing out his shovel was nearly overcome by the rush of gas and smoke that poured out. For a long time scientists speculated on its origin while thousands of persons visited the spot to see the wonderful sight.

The bluff is very abrupt, rising to no more than 100 feet in height and presenting a variegated appearance, due to the chalky, mild yellow sulphur, and bright yellow sulphur rocks in the process of formation, and to the large amount of alum, mica and lignite there imbedded. On each side there is a wing extending to the edge of Pease creek, and in faces as does the bluff, and all the wings and bluff arise to an almost perfectly level tableland. On the summit of the bluff grows a beautiful flower resembling the white water lily. The flower also has rather a strange record, as the only other place it is known to grow is on Spirit Mound, S. D., which for many years was the camping and council grounds of a certain Indian tribe, and which, on the death of the chief became his grave. According to legend this flower sprung from his grave, and the superstitious still seem to detect something unearthly in the mild sweet perfume of the mound lily, as it has been named.

The theory of the mound is this: There is known to exist from the northern to the southern boundary, and from the western to the Missouri river, and east of it in some places, vast beds of lignite coal, and it is supposed that one of these beds lie beneath this bluff and is being consumed by the internal heat. This looks very reasonable, as on digging but a few inches pieces of half burnt lignite and sulphur stone are found, and sometimes a thin blue flame accompanies the smoke.

South Dakota has another curiosity, the famous Wind Cave, near Hot Springs, which was formally opened to the public May 15. This wonderful cave was discovered by a cow-boy in 1884, and was named Wind Cave from the roar of an out-rushing current of air at the opening. The original entrance was an oval-shaped hole about 8 x 12 inches across. Soon after this discovery the hole was enlarged to 18 x 30 inches. Nothing further in the line of development was done until the spring of 1890, when its present owner made the entrance easy by blasting out the solid rock. Since that date explorations have been made until at this date about 2,100 subterranean chambers of various sizes have been found connected by seventy-seven miles of passages; \$5,000 has been expended in clearing out the passages so they can be easily traveled.

H. C. Chapin.

MORE WESTERN ONYX.

FOUR New Mexico citizens, Messrs. D. W. Clearwaters, Calvin Rucker, E. B. Bronson and W. H. Austin are the owners of an onyx quarry at La Luz, N. M., which is declared to be one of the richest finds of valuable stone made in many years. The ledge where the onyx is found is said to be twelve feet in width extending to an unknown depth. All shades are found from the brown or white to green and black mottled. In the same quarry are also large ledges of fine marbles of various colors and by no means the least valuable is a large ledge of excellent lithographic stone. At present this valuable material is practically unavailable owing to its distance from market and lack of transportation facilities. But efforts are now being made to open a railroad through this section of New Mexico which is rich in other things besides marbles and precious metals and hence its advent is sure to come in the near future. When once the railroad is built and running in the vicinity of these quarries its output will make the four owners rich in a very few years.



"If you would not live to be old, you must be hanged when you are young."

HISTORY has never even attempted to enlighten the world in regard to the name of the author of this *interesting* and *remarkable* proverb. The different encyclopedias furnish no light upon the subject, while the varied and multiplied qualities of almanacs, that supply mankind with every kind of undesirable information, are silent and no details are recorded in regard to his existence whether he took a dose of his own medicine and was electrocuted while surrounded with rattle-boxes and rag babies, or withered away with old age.

It is not only unjust, but even criminal, to pass so severe a sentence upon those who are indulging in the merry sunshine of life. Youth and manhood, in their fresh embodiments healthful, strong and vigorous, fragrant with sweet thoughts and expectations, attract the attention and admiration of all, possibly the envy of many. Old age regards the memory of youth with a sigh and finds among the young its most congenial society.

Ever since the dawn of history we are led to believe that Time, Thought and Experience have not wrought in vain.

The mile-stones of each succeeding age are simply periods of progress—civilization and enlightenment. It is obvious that the earth had a beginning; it is also fair to reason from analogy that the planet we now inhabit will have an end.

In tracing out the history, customs and habits of nations which existed in prehistoric times and comparing them with our own of the present century, we are led to believe that science, education and even man himself have reached their highest elevation. The movements onward, both of the earth and the inhabitants of the earth, have been incessant, each in its own sphere, occupying positions superior to those of the preceding ages. Youth and old age of our own times, the antiquated relics of the past are still in their infancy (although apparently old to us) when compared with the results and accomplishments of nature since the first formation of the earth's crust. The retrospective furnishes conclusive evidence that there

is no absolute certainty in counting time in geological history. Certain periods have been determined by the fossil remains of plants, animals and vegetable growth which existed in antediluvian times that have been discovered within the past few years.

Each period had its peculiar organic forms and the species of animals of one epoch neither lived before nor after this epoch, so that each period was simply a succession of cemeteries. The abodes and habitations of nations in the earliest periods of the earth were temporary abiding places, as all tribes were endowed with a restless and migratory disposition.

The Taurians, or barbarians, who first occupied the table-lands of Asia, south and east of the Caspian sea, were the first people to move forward. In their aimless wanderings, they finally settled in China and established that empire. Their occupation consisted chiefly in hunting and in their leisure they devoted their time to manufacturing gods. Later on Socrates took exceptions to this kind of manufacturing enterprise and on account of his obstinate ideas was condemned to death.

Contrast, if you please, the ignorance and superstition that prevailed among the ancients with the education and refinement of the present time. Liberal ideas unrestrained and the pursuit of happiness, according to our own individual desires and tastes, are allotted to the people of the 19th century. In respect to human nature, if not in other respects, progression has proved itself a benefactor. Again looking at the beneficent results of nature, we find that after the earth had cooled down it became covered with a luxuriant growth of vegetation which sprang up spontaneously upon a heated soil.

The antediluvian forests of pines are to-day being transported throughout the length and breadth of our continent in the form of anthracite and bituminous coal. When we consider that the coal beds of the United States alone cover a space of 120,000 square miles, it will be seen that the time occupied in forming these immense deposits was beyond calculation. It needed but the genius of man to convert this wealth of centuries into the varied mechanical and domestic uses to which this deposit is adapted.

The rocks through which the canon of Colorado is cut are 3,000 feet high and extend for a length of 200 miles. The horizontal strata are stretched several miles back from the stream to a height of 7,000 feet above the level of the river bed. The time occupied for the formation of these rocks and also for their excavation was millions of years.

The rocks which were formed out of the second formation of the earth's crust are known as the Archean and are very extensive in their range, being found in all parts of the globe and are in fact the only universal formation outside of the original crust. The Adirondacks of northern New York and the Green mountains of Vermont were among the first exposed

ranges of mountains belonging to the Archean range. They comprise gneiss, granite, mica, schist and hornblende rocks as well as crystalline



SINGING SANDS ON LAKE CHAMPLAIN (ON THE D. & H. R. R.)

limestone. Iron ore is also a peculiarity of this section and the derivation of Iron Age takes its origin in this way.

Between these two great ranges of mountains which form two immense bulwarks—the Adirondacks upon the west and the Green mountains upon the east—is situated Lake Champlain and its valley. This valley is, without doubt, the most remarkable section of New York—not only on account of its beautiful and picturesque scenery, but it is also indissolubly connected with the present age by the historical events of the past. The waters covered this valley and even the mountains adjoining it. The spur of the White mountains upon the east which reaches a height of 6,634 feet was one of the prominent peaks of the Appalachian range that rose above the level of this body of water.

The earliest form of transportation recorded was over this section in the form of a gigantic ice sheet or an immense glacier, occupying a space of 4,000,000 square miles and several thousand feet in thickness. This immense body of ice was formed in the Canadian province and floated in a southwesterly direction, ultimately reaching the Mississippi valley. Indis-

putable evidence has demonstrated the fact that the White mountains in New Hampshire were scratched and had come in collision with this ice sheet at a height of nearly 6,000 feet. Ice in this form was an important factor in transporting boulders, pebbles, earth and gravel. Boulders thus transported during the glacial period have been traced two and three hundred miles. The glacial drift has stratified in the valleys, because the flowing waters in which the sand and earth were deposited spread this material out in beds. The Mettowee valley through which are located the extensive slate deposits of Vermont and New York occupies a transverse position from that of the Champlain valley and is situated on the southern trend of the Adirondacks and also at the southern terminus of the Champlain valley. The sedimentary deposits of mud, clay, etc., which were the original formations of these slate beds, were thus transported and distributed throughout the length of the Mettowee valley, through the agencies of the glacial drift. Washington county, New York, within a radius of a few miles only, produces all the red slate quarried in the United States. Producers of slate have accounted for this red slate deposit by simply stating



VIEWS OF AUSABLE CHASM (ON THE D. & H. R. R.)

that it is attributable to the excess of iron it contains. True, but how did the iron work its way into this particular deposit? The presence of iron in this particular locality was due to the glacial drift and was brought forward from the iron section of the Adirondacks.

Rocks containing iron, especially those in decomposition, often have the iron washed out of them and deposited in other sections in the form of a solution, as bicarbonate. Thus in moving onward from one period of time to another, we see again that the ingenuity of man has been brought into requisition by quarrying an imperishable stone which forms a permanent covering to his dwelling.

One of the earliest periods of time is the Quaternary period, or age of man. This period is subdivided into three ages—the Glacial, or Drift, the Champlain and the Recent, or Terrace. The Glacial period was followed by one of depression. It was the era in which all of the great glaciers were melted and in which the deposition of the sand and earth they carried occurred. At the close of the Champlain period the continent was brought to its present level. The culminations of mammals was during the warm Champlain period. It is sufficiently indicated that man was a contemporary of the mammals of this period from the relics that have been found such as stone arrow-heads, hatchets, lance-heads, and buried human bones. The increased interest which is conferred upon the Champlain valley and the Adirondacks by the vicissitudes of historic ages and the tokens of them remaining at the present day constitutes after all one of the principal attractions of this particular locality. The old fort near Ticonderoga, N. Y., is a suggestive mile-stone in historical events of the preceding century, when the brave and intrepid Allen demanded its surrender May 16, 1775, "in the name of the Great Jehovah and the Continental Congress," and also when Burgoyne was followed by his series of defeats, as he sailed over the placid waters of Champlain with his bodyguard of 10,000 redskins.

Again glancing backward through the long vista of centuries, ages and periods of time, we can imagine the wild waves of this great sea, which covered hills, valleys and mountains, beating tumultuously and madly against the sedimentary deposits which were then forming into permanency the Archean range. The contributions which these waves brought forward were of a vegetable nature, its depositing was in this mountain range near Ticonderoga, N. Y. The graphite which was thus formed, constitutes one of the most useful and necessary commodities of the present time. There is hardly a household, office or counting room throughout the United States that has not had a representation of this deposit, either in the form of a Dixon lead pencil or blacking, etc.

The intelligence and device of man discovered and utilized this formation so that its demands are now universal. It is reasonably certain that

the present age in accomplishments, science, art, industry and commerce far exceed the marvelous tales ascribed to the gods and heroes of ancient times. The application of steam and electricity astonish us by their diversified influence. The comfortable and even elegant surroundings, the traveler, pleasure-seeker or invalid enjoys while he is comfortably seated in a drawing-room car of the Delaware and Hudson Canal Co. R. R. safely speeding over one of its principal thoroughfares, which penetrates the primeval woods of the Adirondacks, or winds itself along the historic shores of Lake Champlain, surpasses in elegance and refinement the ancient and luxurious equipages of lords, kings and potentates.

Geo. H. Harris.

It is a little discouraging to a man to carry a yowling, squalling baby around for half a night, then sit down and reflect that "of such is the kingdom of heaven."—*Cleveland Plain Dealer.*

"I consider it the best of its kind I have seen."—*O. E. Johnson, Joliet, Ill.*

During the last week of January, 714,022 paupers received government relief in England and Wales. Of these, 198,446 were "indoor" and 515,586 "outdoor" relief cases. The percentage of paupers to population that week was 24.3 per 1,000. The returns show a general improvement over all years since 1857, with the important exception of last year.

"We consider STONE a very valuable source of information and standard of reference in our line of business, and would not do without it."—*The H. Wales Lines Co., Meriden, Conn.*

The total number of vessels in the British mercantile marine, say Lloyd's latest returns, is 21,542, with an aggregate tonnage of 12,203,761 tons. Of this number 7,960 are steamers with 8,980,203 gross tons, or an average considerably over 1,000 tons each. Last year England added 872 vessels of 984,670 tons, of which 21,000 tons were purchased from foreigners. But England also sold to foreign nations, chiefly Norway, France and Germany, 117,000 tons more than she purchased. In the last six years four million and a half tons of steamers have been added to the register, and only one and six-tenths million tons have been removed; and of the latter the greater number have only changed flags and are still competitors for trade. In the same period 913,000 tons of sailing ships have been added on 1,206,000 tons removed; so that there are fewer sailing ships on the register now than in 1887.

"It would be a sore trial to be without STONE."—*Louise McK. Taylor, Talladega, Ala.*



[Report on National Museum Building and Ornamental Stones.]

THE WEATHERING OF BUILDING STONES.—II.

CHEMICAL AGENCIES.

Composition of the atmosphere.—The atmosphere in its normal state consists of a mechanical admixture of nitrogen and oxygen in about the proportions of four volumes of the former to one of the latter, together with minute quantities of carbonic acid, ammonia, and vapor of water. In the vicinity of large manufacturing cities, however, it carries in addition to increased proportions of carbonic acid,* appreciable quantities of sulphurous, sulphuric, nitric, and hydrochloric acids. These, when brought by rains into contact with the walls of buildings, are capable, throughout many years of time, of producing marked effects, especially when aided by the extreme diurnal ranges of temperature common in the eastern and northern United States.**

Chemical action of the atmosphere.—The series of changes induced by these agencies are, as above indicated, chemical in their nature and may all, as first suggested be conveniently grouped under the heads of oxidation, deoxidation, hydration, and solution. These may as well be considered in the order given.

Oxidation.—The process of oxidation is commonly confined to those stones which carry some form of iron as one of their constituent parts. If the iron exists as a sulphuric (pyrite or marcasite), it very probably combines with the oxygen of the air on exposure, forming the various oxides of iron such as are popularly known as "rust." If the sulphide occurs scattered in small particles throughout a sandstone the oxide is disseminated more evenly through the mass of the rock, and aside from a slight yellowing or mellowing of the color, as in certain of the Ohio sandstones, it

does no harm. Indeed, as suggested by Prof. Winchell,** it may result in positive good, by supplying a cement to the individual grains, and thus increasing the tenacity of the stone. In all other than sandstones, however, the presence of a readily oxidizable sulphide is a serious defect, since crystalline rocks require no such cement, and the change in color can in very few cases be considered other than a blemish. This is well illustrated in some of the lower courses of granite in the new capitol building at Albany, New York, to which reference has already been made. More than this, the pyrite, in decomposing in contact with the gaseous atmosphere of cities, may give rise to small quantities of sulphurous and sulphuric acids, which by their corrosive action upon the various mineral constituents of the stone render it porous and more liable to the destructive effects of frost. The conversion by oxidation of a sulphide into a sulphate is moreover attended with an increase in volume; there is thus brought to bear a mechanical agency to aid in the work of disintegration.

Iron in the form of a ferrous carbonate is a common constituent of many calcareous rocks, and in the form of other readily decomposable protoxide compounds occurs not infrequently in the cementing material of fragmental rocks lying below the water level. All these compounds are susceptible to oxidation on exposure to atmospheric influences, and to these more than to the presence of sulphides is presumably due the mellowing commonly observed in white marble or the light gray sub-carboniferous sandstones.

Iron, in the form of magnetite—a mixture of the ferrous and ferric oxides—is liable to still further oxidation, becoming converted wholly into the hydrous or anhydrous ferric oxide. Thus, if abundant, the rock assumes a rusty hue, and perhaps gradually falls away to a coarse sand, as is the case with certain of our diabases.†

Black mica, hornblende, augite, and other silicate minerals rich in iron are also liable on long exposure to change through the further oxidation of this ingredient, but when a stone is placed high and dry, as in the walls of a building, this change must necessarily be so slow as to be of little moment, though of the greatest importance from a geological standpoint. Mr. Wolf, however, states†† that tombstones of diabase in cemeteries about Boston have in some cases turned a rust-brown color, the change apparently occurring in the hornblende and augite. The feldspars of the granites used in this same city were also observed in many cases to have become liver-brown, rusty-red, or yellow owing to the higher oxidation of the iron contained by them.

Deoxidation.—The process of deoxidation, whereby a ferric is changed to a ferrous oxide, is possible generally only in presence of organic acids and continual moisture. It is likely, therefore, to affect only those stones

used for foundations, and need not be further considered here. The same may be said in regard to hydration, whereby an anhydrous is changed to a hydrous oxide. The blotching and variegation of beds of sandstone, as those of Marquette, Mich., is due to the deoxidation and hydration of the iron oxides forming their cement, together with a partial removal of the same by the aid of organic acids. Such changes are presumably possible only in the quarry bed or in moist foundations and bridge abutments.

Solution.—The subject of solution can not, however, be passed over so lightly. Pure water alone is practically without effect on all stones used for building purposes. Rain-water, however, as already noted, may contain appreciable quantities of various acids which greatly add to its solvent power, as the rapid destruction of certain classes of rocks only too well attests. Carbonate of lime, the material of ordinary marbles and limestones, is particularly susceptible to the solvent action of these acids even when they are present in extremely minute quantities, and to this agent is largely due the rapid defacement of the marble tombstones in church-yards and the marble-faced buildings in cities.

It is to the ready solubility of calcium carbonate that is due in large part the poor weathering qualities of sandstones with calcareous cements. The calcite is slowly removed by solution; the silicious grains thus become loosened, and, falling away under the influence of wind and rain, expose fresh surfaces to be acted upon. Certain of the ferruginous cements are likewise susceptible to the influence of the acidulated rains, though the anhydrous oxides occurring in the Potsdam stones are, according to Julien, less soluble than are the hydrated forms occurring in those of Triassic age.††† The feldspars of granites and other rocks are also susceptible to the same influence, though naturally in a much less degree. The acidulated rains aided by the disintegration produced by temperature changes may in time partially remove, in the form of carbonate, the alkalies—potash and soda—and the rock slowly disintegrates into sand and clay. The feldspars of the gneiss, used so extremely in years past in and about Philadelphia, are said to have proved peculiarly liable to this change, and it has been found necessary in many instances to paint some of the older structures formed from it to avoid serious disintegration.

* Twenty-one tests of the air in various parts of Boston during the spring of 1870, yielded Mr. Pearson 385 parts of carbonic acid in 1,000,000. Eleven tests of the winter air of Cambridge yielded Mr. Hill 337 parts of the acid in 1,000,000 (Second Annual Report Massachusetts State Board of Health, 1871, p. 52). Dr. Kiöder found the outdoor air of Washington to contain from 387 to 448 parts in 1,000,000. Mr. Angus Smith (Air and Rain, p. 52), after an elaborate series of experiments, reports the air of Manchester (England) to contain on an average 442 parts of the acid in 1,000,000.

** Dr. Smith (*op. cit.*) found the proportions of these acids in London, Liverpool and Manchester to be as follows:

Localities.	Sulphuric.		Hydrochloric.		Nitric.	
	Grains per gallon.	Parts per million.	Grains per gallon.	Parts per million.	Grains per gallon.	Parts per million.
London.....	1.4345	20.49	.0872	1.250	.....	.840
Liverpool.....	2.7714	39.69	.7110	10.16	.....	.582
Manchester.....	2.9163	41.66	.4055	5.79	.....	.886

He also found that the *total* acids for Manchester to average for 1870 3.7648 grains per gallon. It should be noted, however, that these acids were not considered as existing in the atmosphere entirely in an uncombined state, but were probably in large part combined with other substances to form chlorides, sulphates, etc. L. P. Gratacap (School of Mines Quarterly, May 1885, p. 335), from a series of tests at Staten Island, New York, computed the entire amount of chlorine brought down by the rains during 1884 to have been some 46.23 pounds for each acre of ground. This is regarded as in large part combined with sodium to form sodium chloride (common salt.) Egleston (Cause and Decay of Building Stone, p. 5) estimates that the 4,500,000 tons of coal annually burnt in New York City discharge into the air 78,750 tons of sulphuric acid. In 65 cubic centimeters of rainwater caught during an exposure of forty-one days, this same authority found $4\frac{1}{2}$ milligrams of sulphuric acid.

*** Geol. of Minn., Vol. I, p. 189.

† In one part of the dikes that form the Hanging Hills at Meriden, Conn., the rock (diabase) is quite black, and the amount of iron (nearly 14 per cent. of magnetite) has been the cause of rapid disintegration. Hawes, Am. Jour. Sci. Vol. IX, 3d, 1875, p. 188.

†† Rep. Tenth Census.

††† Julien, Rep. Tenth Census, Vol. x, p. 776.

[TO BE CONTINUED.]

Geo. P. Merrill.



BUILDING BUDGET.

Philadelphia Prints.

Since my last letter I have had the pleasure to witness the practical manner of testing the quality of stone as to power of resisting compression. In this instance a new company having taken hold of the old Neshaminy quarries in Bucks county, Pa., have opened what is now known as No. 3 quarry and have struck a magnificent vein of blue granite in large paying quantities which will prove handsome as well as valuable building material. The compression test of this new find spalled at 84,000 pounds and crushed at 92,000 pounds, showing a remarkable resistance power and of a dry nature and impervious to dampness, the analysis showing it to possess all the usual substances necessary to health-giving influence in the construction of walls. This enterprising company headed by E. E. Shelly, president, is now constructing additional means for producing the stone in large sizes and in addition putting on the market crushed stone of all sizes for concrete work, walks, drives, etc. Offices have been opened on the eighth floor of the Provident Life and Trust Building in this city.

Architects in this city are extremely busy upon plans for various structures many of which will partake largely of stone in construction. Thomas P. Lonsdale, architect, is engaged on drawings for a stone and brick church to be erected at Spring City, Utah, to have a slate roof. The same architect is preparing plans for Temple Baptist College to be built of Avondale stone at Broad and Berks streets in this city; this is an adjunct institution to the well known Russell Conwell's church. Hazelhurst & Huckel, architects, Drexel building, are also making plans for a number of structures in which stone will be the major material so far as the walls and considerable interior work are concerned, the principal one of these being a handsome residence and stable for Daniel Baugh, Esq., to be erected at 16th and Locust streets in this city. The building will be in Italian renaissance carved and first modeled before cutting in Indiana blue limestone; both structures will cost about \$250,000 when complete. Furness & Evans, architects, in the Provident building, have also completed drawings of a church at Jenkintown, Pa., to be of local blue limestone and quite handsome in design; they have also several contracts to prepare drawings for rural homes of the same material and other trimmed stone. The Hotel Vendig at 12th and Market streets, will also be enlarged by adding two stories to be of buff brick and red sandstone from plans by the architect who prepared the original drawings, J. Franklin Stuckert, 49 North 13th street.

P. A. Welsh, architect, of 429 Walnut street, has also made plans for a number of buildings in which stone, slate, terra-cotta and hard brick will be the leading features. Several houses at Norristown, Pa., will have considerable brownstone trimmings and slate roofs. A fine residence for Crosby M. Black at Chester, Pa., to be of stone from local quarry and a slate roof. Another at 38th and Spring Garden streets for M. McManus, which will be of a selected stone, slate roof, and of a very handsome and unique design.

E. F. Durang, architect, 12th and Chestnut streets, will during the season supervise

a number of buildings of stone construction among which will be a very handsome convent building attached to St. Charles Boromeo at 21st and Christian streets in this city; it will be of Wyalusing stone entirely, Italian tile roof. Also a fine parochial dwelling will be erected from plans by the same architect, for the R. C. Congregation of Our Lady of Mercy at Broad and Susquehanna avenue, of stone same as the church, dressed and rough face as per drawings. Also a number of minor structures in which the trimmings and bases are to be of stone. Mr. Durang is somewhat of a believer in the durability of stone in the construction of large buildings, such as churches, halls, temples, etc. A very handsome additional dormitory is being erected at Bryn Mawr College which will be entirely of blue limestone, from plans by Cope & Stewardson, architects of this city; the same architects report a number of plans on boards for suburban houses to be erected during the season.

Frank R. Watson, architect, 518 Walnut street, reports quite a list of plans prepared in his office for stone and brick structures among which may be noted drawings for Trinity Park P. E. church at Tacoma Park, Washington. This will be erected as a memorial to Francis S. Key, author of the national song "Star-Spangled Banner," to be purely gothic and walls of a stone found in that vicinity, slate roof and finely finished on interior. Also plans for the P. E. church of the Resurrection in this city, to be of stone, slate roof. Also for Trinity Lutheran Church at Chester, and a handsome brownstone structure for St. Stephens church R. C. at Broad and Butler streets, to be of brownstone Gothic in style, and will be ornamented by two large towers of the same material at each corner of the front, the roof will be of slate while the whole building will be highly ornamented by arched windows with stained and leaded glass. Also drawings for a stone house to be erected at Ashbourne, Pa.

A. J. Drexel and J. Lowber Welsh have purchased several blocks of ground in the northeastern portion of the city upon which it is understood many fine buildings are to be erected during the season. I believe from what we know of stone in the past and its uses as adapted to the purpose of building, coupled with experience and present teaching, it is safe to predict that it will for all time remain the leading material in the construction of homes as well as other buildings by man.

B.

Washington, D. C., Notes.

Through the courtesy of the Secretary of the Treasury, your correspondent has been permitted to examine the official statements regarding the imports and exports of the United States for the month of March, and for the nine months ending with March 31. These figures are the latest trade statistics, are corrected to April 29, and therefore may be considered in every way reliable and authentic. From this statement it is seen that the total imports of stone and marble, and manufactures of same, during the month of March fell short of the imports of the same articles during the same month a year ago, in other words, in March 1892, these imports were worth \$136,424, and during March of this year these reached a valuation of \$130,231. But notwithstanding this apparent falling off in the imports during the single month of March, the imports for the nine months ending with March were considerably in excess of those during the same period in 1892, the contrasting values being \$1,174,383, against \$979,848. Of these totals there was imported of stone and manufactures of stone, including slate, \$66,769 worth, against \$39,596 worth imported in March last year. During the nine months closing with March these imports reached a valuation of \$411,450, against \$335,777, during the corresponding period of 1892. The March imports of marble were valued at \$63,512, considerably less than in March last year, when \$96,828 worth was imported,

but the total figures of the nine months make up for this falling off. These imports were worth \$762,933, against \$644,071, imported during the nine months ending with March last year.

The total exports of marble and stone, inclusive of roofing slate, during the month of March, reached a value of \$64,435, against \$65,610 during that month last year, and \$589,815 during the nine months ending with March, as compared to \$514,949 during the same period in 1892.

The March exports of marble and stone, in the rough, were worth \$12,084, against \$10,851 in March last year. During the nine months ending in March these exports reached the value of \$106,882, against \$126,194 during the nine months period in 1892.

The March exports of roofing slate fell notably short of those of the same month last year, dropping from \$6,476 to \$1,108, and from \$53,756 during the nine month ending with March last year, to \$26,182 during the same period which closed with March of the present year.

The exports of all other manufactures of marble and stone, show a slight increase over the outgoing business of March a year ago, the comparative figures being \$51,243, against \$48,283. The shipments of the nine months ending with March, footed up \$456,751, as compared to \$334,999 during the corresponding period of 1892.

During the month of March \$205 worth of slate was re-exported from the United States, and during the nine months these figures reached a total of \$579, as compared to \$50 during the nine months ending with March last year.

The Stone-Cutters' Union of this city are still working upon Secretary Carlisle, for some action on the contractors of the new postoffice building, who are reported to be employing alien stonemasons at \$1.00 per day less than the schedule paid other workmen. It is claimed that they are Italians, and cannot speak a word of English, one of them in particular, having only arrived in Castle Garden four days before he was given a situation. The men are boarded by the foreman in charge of the work. A protest has been filled with the Secretary of the Treasury, setting forth the violations of the requirements, that men employed shall be paid the schedule price in the locality where the work is done.

The Commissioners of the District of Columbia have recently entered into a contract with the Richmond Granite Company for the furnishing of 150,000 granite paving blocks, at \$51 per thousand. They have also made a contract with the Hurricane Granite Company for a like amount, at the same price. Similar agreements have been entered into with A. M. Smith for furnishing 300,000 granite paving blocks at \$50 per thousand, and Booth Brothers for 200,000 granite paving blocks at \$49 per thousand. The entire contracts amounting to an expenditure of upwards of \$30,000.

The stone-cutters of Washington are out on a strike, they have made several claims upon the master-stone-cutters, which the latter are unwilling to allow, and have taken steps to fill the places of the strikers by sending for cutters in Philadelphia, New York, and Boston. It is said that should the difficulty not be adjusted to the satisfaction of both parties the advent of out-of-town mechanics will mean nothing less than the absolute dissolution of the local stone-cutters' assembly. These men are now receiving forty-five cents an hour for eight hours' work, with semi-monthly pay-days. In many of the yards they draw every Saturday a part of the wages due them, which in many instances amount to almost the entire sum earned.

The first point of contention is a demand for weekly payments. This is a burden that many of the employers find difficult to bear from a financial standpoint.

Another point raised by them is that no yard shall employ more than two apprentices, without regard to the number of men engaged in the establishment. Under the

present rule four boys are learning the trade in each of the fifteen or twenty yards in the city. This means an average addition each year of about fifteen stone-cutters.

Not the least important contention is the claim of the cutters that stone should be "set" on the building by a stone-cutter, and not by a stone-mason. The employers contend that, when the stone leaves the yard in a finished state, the connection of the cutters with its disposition ceases.

It is believed that the stone-masons are supported by the brick-layers, who constitute a powerful element in trade matters. These will not "back up" any stone set by any one other than a stone-mason. Meanwhile there is a vast deal of excitement prevalent in trade circles because of the strike.

GEO. W.

Minneapolis and St. Paul.

George McMullen, well known in Minneapolis and the Northwest as a pioneer resident and stone contractor, died at his home in Minneapolis May 8. His death was very sudden, there being but a few moments' warning. Mr. McMullen was a resident of Minneapolis for upwards of forty years, and was about eighty years old. He came here from Canada, and followed his trade, that of stone-mason. Before long he was given many of the large stone contracts. He built several of the large mills in Minneapolis, and also did considerable bridge work for railroads.

Thomas Lowry, the capitalist and railroad king of Minneapolis, is making extensive improvements in a tract of choice residence property known as "Lowry Hill." His latest scheme is to put up a magnificent arch entrance of solid stone. He has had plans drawn by Orff & Jorelmon and the arch has been submitted to contractors for bids. It would be an entirely new feature in Minneapolis. The cost of the arch would be about \$6,000. The material is granite. It is thirty feet high and eighty feet long. The arch is twenty-five feet wide and eighteen feet high. The pedestrian entrances are on either side, and the appearance of the work is solid and massive.

The Minneapolis stone-masons ought to be satisfied. Wages now being paid for their work are good, ranging from 30 to 35 cents an hour. The demand for workmen is increasing and it is possible before the summer is ended as high as 40 cents per hour will be paid men of this class. The wages are slightly in excess of those paid last year. The demand for this labor is the best for several years.

Fred Widell, of Mankato, Minn., has secured the contract for the stone work on an elevator to be built in Minneapolis, amounting to \$12,000, or 200 carloads of stone. He has also been awarded the contract for a large retaining wall to be built by the Milwaukee road at St. Paul. It will require 400 cubic yards of stone or 500 carloads, valued at \$15,000.

T. D. Allen & Co., of Minneapolis, have made designs for a handsome school building at Pipestone, Minn. The building, according to the plans, is 84x93 feet on the ground, built of redstone from the local quarries, and trimmed with pink jasper. The roof is covered with tiling laid in a tasty pattern.

The Baxter granite quarry at Ortonville, Minn., is rushed getting out stone for the Minneapolis court-house.

A Minneapolis paragrapher suggests that the Prentice monolith which is causing so much trouble, be stacked up somewhere in its native state as a monument to James G. Blaine.

The well-known stone contracting firm of Ring & Tobin, of Minneapolis, has been dissolved. James J. Tobin retires and the business will be conducted by Martin Ring.

Minnesota will spend \$20,000 on monuments, so the legislature has decreed. One monument is ordered for Chickamauga battle ground, Georgia, to mark the place where the Second Minnesota Battery fought, and the Second Minnesota Infantry relieved and fought in the bloody place of the Twenty-first Ohio. The monument is to cost \$15,000, and is to be located by a commission under the direction of the government on Chickamauga field. The heroes of our Indian war are also to be remembered, two monuments are to be ordered for these, one for Birch Cooley, and one for Camp Release. The cost of these monuments is \$2,500 each.

The architects, Long & Kees, have been doing some tall estimating on the Minneapolis court house and city hall. The final and fourth estimate on the completion of the building makes the total \$1,694,321.79. This with architects' fees and the amount already expended would make the total cost \$2,995,303.16. The granite and brick work are figured at \$377,831.45; marble and mosaic work, \$145,000 (a reduction of \$15,000); granite carving, \$18,000 (a cut of \$10,900). Work will be pushed and bids advertised in the near future.

The Minnesota legislature made a good many appropriations for public buildings. The \$175,000 allowance for the state university, library and assembly hall, is the most notable. The insane hospitals and normal schools nearly all get appropriations for additions or improvements which will call for considerable stone one way and another. Bids are now being received for a new wing for the Fergus Falls asylum.

The building season in Minneapolis and St. Paul has now got well opened, after being held back by a late cold spring. Foundations are fast going in for large business blocks and fine residences. In addition to those mentioned in the April *STONE*, work has been started on several more large tenement rows in which brick walls and stone trimmings are the general rule.

A large building is being put up near Lake Phalen Park, St. Paul, for the Lutheran college. Bueckner & Jacobsen are the architects and Charles Engelbrecht has the contract. Red sandstone will be used to trim the pressed brick walls.

A. P. Anderson got the contract for furnishing 350 yards of rubble rock to the city of Minneapolis, his bid being \$1.80 per yard.

The St. Paul board of public works has ordered bids advertised for granite, asphalt, and cedar block on concrete for paving Fourth street from Broadway to Jackson streets. It is not yet settled which shall be used.

CHAP.

Pittsburgh Pits.

There has been some complaint among the architects that owing to the long and severe winter we have had work was entirely suspended on several large buildings here in the city and vicinity, but within the last six weeks building operations have been very active. Indications are that architects, dealers in material and contractors will have a very good season as most of them have already secured about all the work they can perform during the building season. Prices for material are steady and afford a fair profit to the dealers. Carpenters, bricklayers and stone-masons all seem to have regular employment and there is no agitation of the wage question between employers and employes, and everything points to a busy and profitable season.

Pittsburgh has had completed within the past eighteen months some very creditable and substantial buildings, prominent among them being Vandegrift and Times buildings on Fourth avenue, stone fronts. The Vandegrift building on Wood and Water streets, eight stories, brick; and Ewatts eight-story stone front building on

Liberty street, all being constructed with a view of affording all the conveniences with good light for office purposes, except the Ewart building which is used for a wholesale grocery.

Some of the most important buildings being contemplated and constructed in this city are: The Fourteenth Ward school building on Bouquet street. It is built of pressed brick and will cost when completed \$125,000. Work is progressing rapidly, the roof is now on, and the building is to be the finest in the city. B. G. Stenner is now having plans made for a large four-story brick and granite building to be erected on South Sixteenth and Carson streets, South Side. The three top floors will be used for office purposes and the first as a store.

The property on the corner of Penn avenue and Third street, formerly owned by Slack & Sholes, has been bought by Capt. Vandegrift for \$65,000. It consists of a lot 60x120 and a three-story brick building. This building will soon be replaced by a handsome six-story building to be used for the production and distribution of power for manufacturing purposes.

Among other important building projects it has been learned that Bell & Caldwell have purchased a large frontage on Margarett street, near Negley avenue, upon which they will erect ten dwellings, brick and stone, of a high class. Three of them have already been started and the rest will be started as soon as possible. They will all be erected this season.

Bown Bros. have had plans completed for their building on the corner of Thirteenth and Liberty streets.

There are a great many fine residences with stone fronts and stone trimmings being erected. Here, as elsewhere, brick is being largely substituted for stone.

Capt. Spratt, of the Bureau of Building Inspection, yesterday completed the report of that bureau for the month of April. There was a total of 385 buildings erected: 126 brick, 258 frame and one veneered building. The total cost of the buildings was \$778,181. The Nineteenth ward led in the number of buildings, having fifty-four, while the Thirtieth and Thirty-third wards were the lowest with one each.

G. L. S.

Detroit Dots.

The bill now before the Michigan legislature providing for the change of railroads from crossing at grade will, if it becomes a law, mean much to dealers in the cheaper qualities of stone. Its effect in the city of Detroit is likely to cause the tracks now encircling the city to be depressed, which would mean a stone-walled viaduct twenty miles or more in extent. One can readily understand what an immense quantity of stone would be required in such an undertaking.

The greatest quantity of the cheaper quality of stone that has been used in the city for any purpose was in the macadamizing of the Grand boulevard last year, and an almost equal amount will be used the present season. The boulevard is some twelve miles long, encircling the city in a half circle, and is 180 feet wide. The regular Telford macadam is what the contract specifies.

The parish of St. Joseph's Episcopal church broke ground for a new edifice a few days ago. The structure will be of Grafton, O., and Ionia, Mich., buff sandstone, and will cost \$40,000.

Architect Raseman has attracted considerable attention to a new residence he is constructing for Dr. J. H. Carstens, one of the leading physicians of the city, on Woodward avenue, our most fashionable thoroughfare. The first story of the house and the

trimmings are of "serpentine greenstone" from Chester, Pa., a variety never before seen in this city, but withal very unique and striking in its effect.

Plans are now being prepared in Boston for the \$500,000 bank building, twelve stories high, which the Union Trust Company will erect in this city. Some of the members of the company are interested in an Indiana stone quarry and doubtless most of the stone used in its construction will come from that state.

The new residence of David Whitney, Jr., unquestionably the finest in the city, is now receiving the finishing touches. It is of pink jaspar, hard as flint but exceedingly beautiful. The work has taken nearly a year longer than Gordon W Lloyd, the architect, had expected, and it is said the cost has exceeded the estimates by a trifle of \$50,000.

The receipts of Portage Entry sandstone are the largest this season in the history of the city, and more stone of every class is being put up.

V. W. RICHARDSON.

Buffalo Bits.

This year will mark the beginning of a new era in the business part of Buffalo. Since the present reign of prosperity began, several years ago, the business men and capitalists have recognized the necessity of replacing the old somber-looking blocks of business houses with buildings of a more modern construction.

Already plans have been prepared for the erection of a ten-story building for the Bank of Commerce, a ten-story building for the Union Central Life Company, a new real estate exchange, and plans are now being prepared for the erection of a handsome edifice to be used as the headquarters of the Republican League.

The Union Central Life building will be on the corner of Pearl, Swan, and Erie streets, and the work of clearing the site is being hastened, and the contractors will push the construction of the building without unnecessary delay. It will be of ornamental fire-proof construction, and will be about 140 feet high. The base will be of Medina sandstone and the body of the building will be of light colored brick. The doorways will be of terra cotta to match the sandstone base. Steel construction will be used throughout. The floors will be of steel beams and brick arches, with fine wood finishings. The base will be all of a handsome marble mosaic, making the large entrance to the building have a most pleasing effect. The basement of the building will be used as a restaurant, with independent entrances as well as entrances from the interior of the building. All the boilers, engines and the dynamo will be under the sidewalk. The Union Central will occupy the lower floor, and the other nine floors will contain eight large well-lighted offices each. The dimensions of the building are 116 x 41 feet. Green & Wicks are the architects and J. H. Tilden and H. C. Harrower are the contractors.

Up to end of last month building permits had been issued this year for the erection of property to cost \$1,956,756. This does not include any of the very large buildings, so it will give a good idea of the amount of general building that is going on in Buffalo.

In a few days Main street, the principal thoroughfare of the city, will be paved with Trinidad asphalt from one end to the other, a distance of about seven miles. Most of it has been paved for several years, but a section of about half a mile in the busiest part of the city was left until this spring. German rock asphalt and American bituminous rock are being used extensively for pavements, and bids are now being asked for the paving of about a dozen streets.

James Boland, one of Buffalo's most successful contractors, was killed by a fall

through a sidewalk about two weeks ago. He was taking the blanket off his horse in front of the Fornes building, when he lost his balance and fell headforemost through the trap in the sidewalk to the basement floor, a distance of several feet. Mr. Boland was unconscious when picked up, and a few hours later, after four doctors had been in almost constant attendance, life was announced to be extinct. Mr. Boland was about forty-two years of age, and had resided in Buffalo all his life. When quite a boy he learned the trade of brick laying, and after following this occupation for several years he entered business on his own account, in which he was so successful that he amassed a competency early in life. Many of Buffalo's largest buildings were erected under his supervision. He was president of the Masons' Contractors' Association, a member of the Builders' Exchange, and a large stockholder in the exchange building. Mr. Boland took a prominent part in republican politics although he never sought political preferment. His wife and four children are left to mourn his loss. There is some talk of bringing an action against the owners of the Fornes building for not having the trap-opening well protected.

Northwestern Nuggets.

All three brownstone quarries at Washburn, Wis., have commenced operations, and expect to put out from 2,500 to 3,000 cars of stone this season, an increase of over 100 per cent over last year's business. At the Prentice quarry the great World's Fair monolith is ready for raising from its bed if the necessary funds for its removal to Chicago are forthcoming.* The designation of this stone as the "Ashland monolith" is an injustice. It is a Washburn production separated from Ashland by at least ten miles of Lake Superior water.

William and Ferdinand Cromer prepared by order of the Faribault (Minn.) Board of Trade, three cubes of marble from the Cromer quarries, for exhibition among the collection of Minnesota stone, granites and marbles at the World's Fair. The stones are cubes 12 x 12, 8 x 8, and 4 x 4, one face of each piece is polished, another hammer-dressed, another sand-rubbed, another rock-faced, another tooth-chiseled, another pointed, six faces in all. The polished faces are beautiful and under a magnifying glass are wonderful. William Cromer states that the Smithsonian Institution at Washington pronounces this marble the finest in America.

The building stone at Spring Valley, Minn., is among the best in Southern Minnesota. The supply of building stone can never be exhausted, it is claimed, and although a number of quarries have been opened they are but mere scratches. Large quantities of this stone have been shipped, giving good satisfaction. The trouble has been in the past that the stone has been blasted out in a haphazard manner, by inexperienced men. Thayer & Cummings have decided to adopt a radical change from the old way of doing business, and have employed as foreman in their quarry an experienced man. They have uncovered ledges or layers of stone from eight inches to three feet in thickness, and of fine quality. A large derrick will be erected sufficient to handle the heavy stone.

Mankato is getting up an elaborate granite exhibit which is to be placed, along with other but different kinds of exhibits, in a Northern Pacific car especially fitted up for the purpose and taken to the World's Fair. Afterward it will be taken East, stopping at all the principal cities. It is expected that in this way stone men all over the country will come to know more about the great granite industry of Minnesota.

The new government building at Mankato, Minn., will be a solid stone structure,

[*The monolith will go to Milwaukee.—ED. STONE.]

two stories high with tower ninety feet high. The walls will be rocked-faced and massive. The two entrances will be marked with heavy semi-circular arches springing from arched stone caps. The windows will be set with heavy stone trimmings.

Stone, brick and terra-cotta will make up the walls of the new government building at Fargo, N. D. Rubble masonry will be used for the foundations of the basement wall to the line of the grade, from grade line to the line of the water table quarry or rock-face work, and above the water table to the line of the first floor window sills cut stone. The porticos and the enrichment of the first floor windows will be of cut stone also. Above the first story window sills the material used will be brick.

Frank Widell has a contract for furnishing the Chicago & Northwestern in Iowa with 500 carloads of stone.

Mankato is very proud of its stone fountain for the World's Fair, and with good reason. Joseph Mosberg made it, practically without remuneration. Some of the ledges take a remarkably fine polish for limestone.

Lydia A. Carli has canceled the lease of the Carli stone quarry given to C. H. Carli, and appointed Charles Rueckert her agent.

The Methodists of Duluth are building a \$15,000 church, the lower part of which will be of cut brownstone. There will also be a high stone tower.

The North Star Granite company of Ortonville, Minn., has contracts on hand to the amount of \$120,000.

The new stone crushing plant at Devil's Lake, Wis., recently erected by Skinner & Company of Chicago, was burned May 2, causing a loss of about \$80,000. The machinery had just been started, and it is supposed that the fire originated in the engine room. There was no insurance. It will be rebuilt.

Twenty carloads of granite from the quarries at Ortonville, Minn., are being used for building out and protecting the embankment of the bridge at Lake Addie, Minn.

The Drake Polishing Company has completed two handsome globes of jasper for the World's Fair. Each globe is eight inches in diameter and weighs four pounds and each is of the finest red stone. The stock comes from the quarries at Jasper, Minn.

Thirty men are at work at McDonnough's quarry at Mantorville, Minn., and more wanted. More business is being done in this line this year than ever before.

Walter Arnold, of the Northern Granite Company, says, relative to a report circulated in some quarters of Sauk Rapids that they will not operate their quarries very extensively this season, that they will work all quarries they operated last year and some others in addition.

The North Star quarries recently sold to Fargo parties are now owned by a reorganized company, the Ortonville Granite Co., with a capital of \$400,000.

Some big rocks are being hauled for the government building at Sioux Falls, S. D. Six of the big pieces of jasper were put on a wagon which weighed 6,000 pounds and it was all four 1,600-pound horses could do to get the wagon and load to the unloading place. The rocks weighed a little over 10,000 pounds.

The Iron River (Wis.) Brownstone Company, with a capital stock of \$150,000, has filed articles of incorporation.

At Washburn, Wis., a \$22,000 school building will be built of brownstone.

The Kuehn Mercantile Company, of Wabasha, has contracted to furnish 3,000 cords of stone to the government for use between Wabasha and Minneiska, Minn.

Kasota stone will be used as trimming on a handsome little bank building to be put up by the Merchants' National bank of Wadena, Minn. William King is the contractor.

A \$65,000 Catholic hospital at Great Falls, Mont., is being built with native home brownstone for the first story and trimmings. Jones & Roberts have the stone contract.

CHIEL.

AN INDIAN METHOD OF CONSTRUCTING ARCHES.

AS far back as 1820 Captain Mackintosh, of the Madras Artillery, communicated a monograph to the "Asiatic Researches" on what he had witnessed at Nagpore in the construction of a semi-circular arch, which was erected by native workmen without any centring, or other usual temporary support, in a way he believed peculiar to that part of India.

The arch was semi-circular, of twenty-two feet span. The piers were built in the usual manner and very substantially. At the spring of the arch, stones of a considerable length were used, having the inner ends cut so as to suit the curvature of the arch, Fig. 2, A A. Six such layers were laid on each side, in the manner stones are placed in what is generally termed the Egyptian arch, the upper layer having a groove five inches wide and two in depth. On arriving at this height, stones of a smaller size

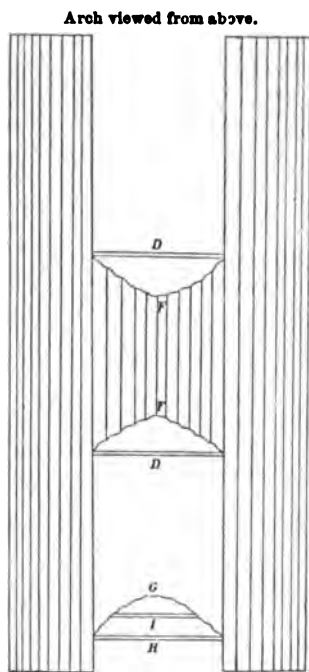


Fig. 1.

were made use of, each having a groove cut in two adjoining faces, two inches in depth by four in breadth, with corresponding projections on the opposite sides, B B B B. These stones were so placed that when a layer was completed there appeared a channel or groove the whole length of the building, ready to receive and bind to it by their projections the next row of stones when applied, C C C C. The stones were of a fine sort of freestone, easily cut. Common cement was used. Eight layers of the stones last described having been placed on both sides, each layer occupying about six inches of the curvature of the arch, it became necessary to prevent the work, if carried on, from falling inward. A space of ten feet in length, on each side of the unfinished arch, was marked off, and at these points two strong horizontal beams were forced into the grooves, extending across the chasm, D D, Figs. 1 and 2. From these, as from a new base, the grooved stones already described were used, the length of each succeeding layer contracting gradually until the application of the key stones, Fig. 1, F F; Fig. 3, E.

When the arch was of considerable span a series of bases such as here described were placed, each base higher than the other, in order to support the work until it was secured by being keyed, Fig. 1, I H. When the center

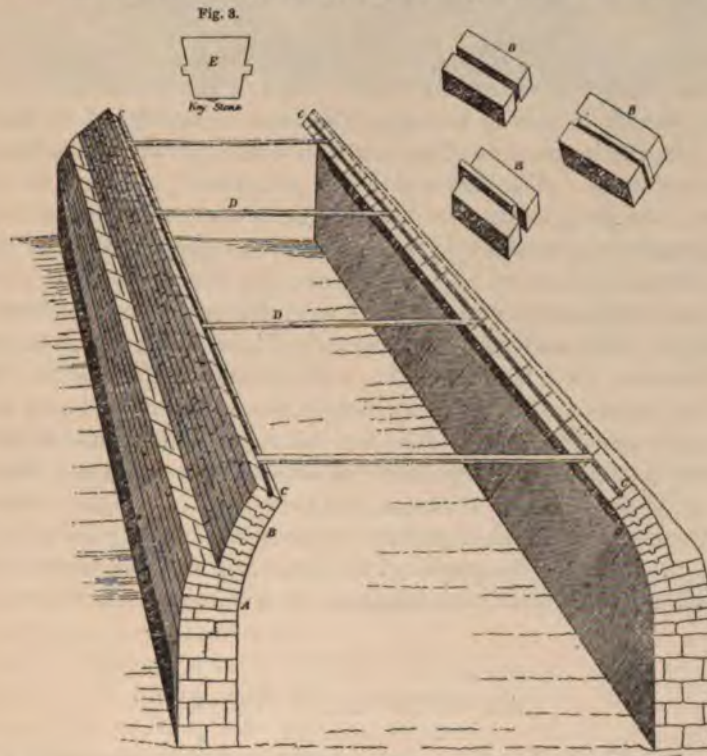


Fig. 2.

portion of the arch was thus completed the beams were removed by being sawed asunder in two places, Fig. 1, F F. In a similar manner the arch was continued in different portions at either end of that part first finished, F G, the introduction of a new beam constituting, with it, a renewed base. A slight scaffolding supported the workmen, H. In this simple though ingenious manner was an arch across a space of twenty-two feet erected without any frame for its support while building. The principle seems applicable, either in masonry or cast iron, to an arch of any dimensions.

Having witnessed with great curiosity the operation Captain Mackintosh endeavored to describe it in the hope that the method might prove of utility in the construction of bridges, domes and other arches, or vaulted buildings.

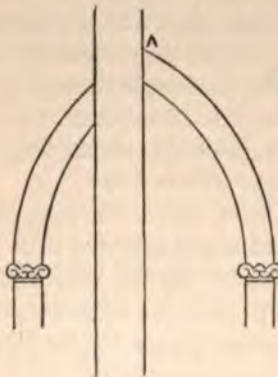
We reproduce the original drawings which accompanied the monograph, with the unique mode of reference therein adopted to elucidate the details.
—*Indian Engineering.*

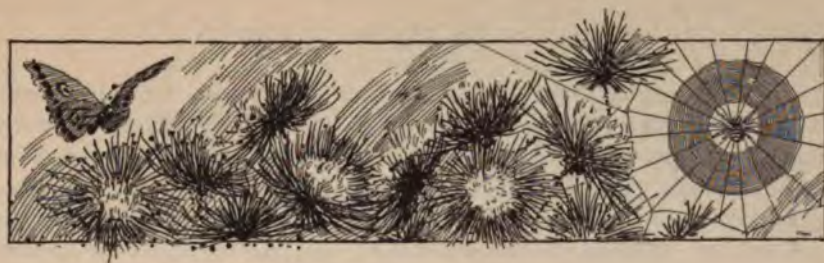
CASTLE OF MARBLE AND ONYX.

GEORGE W. GLANCY, a local marble worker, of Rutland, Vt., has just completed, after nine years' work, a miniature castle of marble and onyx, which is said to be one of the most wonderful of its kind in the world. The castle contains about one hundred kinds of marble from nearly as many countries. A polished slab of "true blue" marble, two feet wide and three feet long, forms the base of the castle. On this stands marble, inlaid to represent brickwork, and on this rests another base of blue marble. Towers of rock-faced blue marble stand at the end of the castle. The towers have battlements and windows with casings of onyx. In one tower is a chime of bells, and in the other a clock, the clock alone being worth \$400. Between these towers is the main portion of the castle. The windows have colored glass, and swinging doors of onyx, hung on silver hinges, open into the castle. The second story of the castle is entirely of onyx, with battlements of handsome Spanish-Lisbon marble. Small vases turned out of onyx add to the beauty of the whole. A flight of onyx steps leads up to the castle, and onyx urns on pedestals of Belgian black marble stand on either side of the steps. The castle will be taken to the fair, and at night be illuminated with wax candles. It is valued at \$3,000.

AN OPTICAL ILLUSION.

THE engraving represents a Gothic arch bisected at one side by a straight column, the apex of the arch being at A. On looking at the two sides of the arch, it will seem impossible that both can be of the same degree of curvature, or that the lines of the shorter side, if extended, will join those of the longer. It can, however, be very easily proven by drawing two lines with a pencil across the straight bisecting lines, when the arch will at once appear in its proper form, although until this is done the eye refuses to perceive the fact, and the appearance of two dissimilar arches persists. This illusion is of practical importance to architects, who, in planning buildings with arches, should avoid placing columns in such a position that the arches will be unsymmetrically divided by them.—*Popular Science News*.





GEOLOGY OF BUILDING STONES.—II.

IN its structure, gneiss is intermediate between mica-slate and granite, and it is often found lying between these two, usually lying under the former, and over the latter.

Clay-slate is in reality nothing but the common roofing slate, and is useful for its fissile qualities, that is, the property of being easily divided into very thin plates. It is the most distinctly stratified of all of the primitive rocks, and something very strange is, as a rule, very highly inclined. That is the strata are found in such a position as to indicate that they have been disturbed from their natural bed, and placed at all angles toward the perpendicular. The clay-slate is associated with granite rocks, and is often superincumbent on the mica-slate.

Primitive limestone is so called to distinguish it from the limestone that has been formed since the primeval times. For limestone is constantly being formed in nature, even now, as for example the mouth of the river Rhone where great deposits are being slowly formed. The primitive limestone is very crystalline in its structure, and is found associated with granite, gneiss and mica-slate, being at times intermixed with the latter, and sometimes alternating with it in layers. No organic remains are found in it, for which reason it is considered like granite to have been formed before the creation of living things. When it is white and pure, it is known as statuary marble, and is much used in the arts. The finest specimens of ancient sculpture are in this material. Particularly fine grades of it are found in the Grecian Archipelago, Switzerland and Italy, and the famous Carrara marble is a fine primitive limestone.

Limestones not primitive, are called secondary, and are easily distinguished from their more ancient sisters; for they are not crystalline like the latter, and are composed in a great part of shells and organic substances.

Porphyry derives its name from a Greek word which means "purple" because the first rock that was called by that name was of a purple color,

but since then many others have been classed under the same name, in fact, rocks having a paste-like base imbedded with crystals are called porphyry irrespective of their color. Its appearance indicates that at some time it was soft and pasty in consistency, and that by some unknown agency, crystals of various kinds, but principally of felspar have been introduced into it. When it is associated with granite, porphyry is considered as a primitive rock, but it is also secondary and granitic in its classification. It would be better perhaps to consider it as a manner of connecting link between granitic rocks and those of an igneous origin.

In some of the splendid edifices of the ancient times that yet exist in a state of ruinous remains, are found some massive columns of porphyry. When its great hardness is considered, they are a tribute to the true luxury of those remote times. Porphyry, from the high polish of which it is capable, and from the variety and beauty of colors often found in it, is perhaps an architectural medium that presents more beautiful and enduring qualities than any other stone. But the labor involved in the making of a pillar forty feet long and four or five feet in diameter such as the ancients used is too great and expensive for modern building. And although not an uncommon rock by any means, yet it does not occur in the great formations in the manner of granite and limestone.

Syenite is a rock composed of quartz, felspar and hornblende, being in reality a granite in which the mica is displaced by hornblende. However, it does at times contain a little mica. In structure it is very similar to granite, being granular, and its prevailing color is a yellowish white, mottled with black, giving it a gray tone. In the city of Boston, there are a number of columns of this material. It is closely associated with granite in the quarries, which it often passes into, as the proportion of mica increases and displaces the hornblende.

At this place it will not be out of the way to say more of the minerals which have been described as constituting the various rocks. There have been mentioned quartz, hornblende, mica, felspar and limestone.

Quartz, when pure, is colorless and transparent, and the crystal is of what is known as the hexagonal form. But on account of impurities, the crystals occur in almost every color. Its chemical name is anhydrous silica, and it is not soluble in any of the acids with the exception of hydrofluoric, the familiar acid with which glass is etched. The localities in which pure crystals of quartz occur are usually in the mining and mountainous districts, and in this shape are usually called rock crystals, and according to the place of finding, are the Cornish, Irish or Alaska diamonds of commerce. In their luster they approach the diamond, but may be distinguished by their crystalline form and their inferior hardness and different specific gravity. Other forms of quartz, some of value are, the

purple amethyst, the citrine topaz and jasper. There are also ferruginous quartz, cairngorm, morion, rose-quartz, milky quartz, sugary quartz, float-stone, prase, and a great many other unimportant varieties. Chalcedony is of the same chemical composition as quartz, but instead of being crystalline, it is amorphous. Notable specimens of chalcedony are the flints, carnelians and agates.

Hornblendes are very commonly of a green tint, and is composed of varying proportions of anhydrous silicates of lime, magnesium, iron and alumina. Fine crystals are very rare, but are at times found in the Ural and at Arendal in Norway. Massive hornblende enters into the composition of many of the greenstone rocks, and is an element that is liable to decomposition. In the same family of minerals are found asbestos and tremolite.

There are a number of micas which seem to the ordinary vision to be identical, but which differ in their chemical composition. They are all anhydrous silicates of alumina, but contain other elements which give to them different names. Muscovite is a mica containing potash, lepidolite contains lithia, lepidomelane contains iron as well as lithia, biotite contains magnesia, while chlorite contains both magnesia and iron. Muscovite is the mica of commerce and which enters into the stove trade, while the biotite micas are the ones entering into the composition of granite rocks.

The feldspars are very important minerals and are several in number not because they vary so much in chemical composition, as in their structures and colors. They are first classed as orthoclase, albite, oligoclase, labradorite, and the amorphous feldspars.

Common feldspar is the orthoclase, and is the constituent of granite. It occurs in masses of a pale pink color in quarries at Roche and Tremearne, both in Cornwall. Fine gray crystals are also found in the granite of Tolpedupenwith near Penzance. Other varieties of feldspar are moonstone, erythrite and amazon stone.

The amorphous feldspar are very interesting, some for example being obsidian, pumice, pearlstone and pitchstone.

Obsidian occurs in globular masses or grains, and is very brittle, having a glassy appearance. It is of a black, brown, or dark green color and is sometimes spotted or striped. It is abundant in the ancient volcanic rocks of Mexico, and was very much used by the former people of that country who fashioned from it mirrors, knives and arrowheads.

Edward C. Weaver.

COST OF STEAM POWER.

IN a lecture delivered at Sibley College, January 20, and published in the *Sibley Journal of Engineering*, Charles S. Emery, Ph. D., considers this subject most exhaustively. The lecture and its numerous tables is too long to be given in its entirety, so we have condensed the matter and arranged a table showing the final conclusions reached.

A unit of 500-horse power was selected for the comparison. In order to make the comparison at the same speed it is assumed in all cases that the power is delivered at a speed of 250 to 350 revolutions per minute, corresponding to the jack-shaft speed of slow engines, and the actual speed of high-speed engines.

It is attempted in this presentation to examine all the principal causes that affect the cost of steam power in engines of different types operated under practical conditions, but the substantial equalization of the cost of the power developed with engines of different types, and different degrees of economy, when expenses independent of the coal consumed are considered, will necessarily form a prominent feature of the discussion, for the reason that they have frequently been neglected in such calculations and inadequately discussed in others, so that their very important bearing on the results is not generally understood. Such additional expenses are fairly constant, independent of the type of engine, and without considering interest or dividends, they will in some cases equal the cost of coal. It will be seen, therefore, in comparing two engines, of which both are good, so that one, for instance, will effect a saving of coal compared to the other of, say, $12\frac{1}{2}$ per cent., making the relative cost of fuel as eight to seven; that if additional costs equal to the former be added to both, the relative economies will be as sixteen to fifteen, and the saving reduced to $6\frac{1}{4}$ per cent. simply by the summation of costs. If, then, we assume that all expenditures should pay 10 per cent. interest or dividends on capital invested, and 10 per cent of the difference in the first cost of the engines equals an amount which represents a saving of $6\frac{1}{4}$ per cent. of fuel, then the cost to the owner of the steam plant will be exactly the same in the two cases, since in the one case he will pay in additional interest, or loss of dividends on the capital invested, the same sum as he will pay for additional fuel if he uses the cheaper engine.

The original cost of the plant is evidently of great importance where

on one hand money is dear, or, on the other, coal is cheap or the work irregular. When the interest or dividend charges, and others akin thereto, are duly considered, it will readily be seen that the number of hours an engine operates in a year has a very important influence on the question of first cost, as such charges will be exactly the same whether the plant be operated one hour or twenty-four hours a day, and likewise the interest will be the same whether coal is \$1 or \$10 a ton. The saving in the total cost of coal consumed, either for short hours of running or low cost of coal, will evidently be such as not to warrant the adoption of high-priced machinery. Other conditions also affect the problem. For instance, with economical engines smaller boilers are required, so the saving in the cost of boilers partly compensates for the higher cost of the economical engine.

Steam engines at the present time may be divided into two general classes, distinguished as high-speed and low-speed engines. The high-speed engines are best distinguished by the fact that they are of comparatively short stroke and develop approximately the same piston speed as long-stroke engines by an increased number of revolutions. There are also simple, compound and triple-compound engines, of both high and low-speed types, either horizontal or vertical. Most low-speed engines are of the automatic cut-off type, and high-speed engines are usually of the fly-wheel governor type, some of which, perhaps, may possess advantages that others do not possess. The engines may also be operated with the steam escaping into the atmosphere or to a condenser, and in the latter case an air pump may or may not be used. The first class are referred to as non-condensing engines, and the term condensing engines is the general one applied to those in which the steam is condensed and a vacuum formed.

COST OF STEAM POWER.

TYPE OF ENGINE.		Water per H - P. per hour. Pounds.	COST OF CONSTRUCTION.				COST OF OPERATION.				
			Cost engines ready for operation.	Cost boilers ready for operation.	Buildings and chim- ney.	Total cost of con- struction with in- stallation and in- terest added.	Cost coal per H-P. per year, 308 P. hour days, at \$4 long ton.	Cost per H-P. per year, operating and interest, ex- cept coal.	Total cost per net H-P. per year, 308 10-hour days, coal \$4 per ton.	Total cost 308 days, \$3 per ton.	Total cost 3.8 days, \$2 per ton.
A...	Simple H.S. non-condensing	33	\$17.50	\$ 6.22	\$15.18	\$93.91	\$25.46	\$17.06	\$42.44	\$36.77	\$ 9.81
B...	Simple L.S. non-condensing	29	25.00	23.61	14.22	68.19	2.96	16.98	39.94	24.22	28.46
C...	Compound H.S. non-condensing	26	21.00	20.61	13.33	59.47	2.76	15.81	35.87	21.86	25.84
D...	Special triple com. H.S. non-con- densing	24	26.00	11.70	12.55	65.37	8.52	16.51	35.02	30.39	25.76
E...	Simple H.S. condensing	22	21.00	17.47	11.95	54.71	16.97	14.76	31.73	27.49	23.25
F...	Simple L.S. condensing	20	27.00	6.32	11.33	59.51	15.83	14.94	30.74	26.77	22.82
G...	Compound H.S. condensing	30	24.50	15.83	1.56	56.14	15.43	4.79	30.22	26.36	22.21
H...	Compound L.S. condensing	18	30.00	14.70	0.92	60.35	14.2	14.84	29.09	25.53	21.97
I...	Special triple com. H.S. cond- ensing	17	29.00	15.33	10.49	59.51	13.11	15.01	28.13	24.85	21.57
J...	Trip'le com. L.S. condensing	6	37.50	14.55	0.32	68.0	12.66	5.77	24.43	25.17	22.10
K...	Trip'le com. L.S. condensing	15	45.00	13.00	8.35	72.97	11.87	16.41	28.28	25.32	22.15
L...	Ditto, for maximum results	14	45.00	12.91	8.15	71.72	9.92	6.75	26.67	24.19	21.71

Referring to the table, the types of engines are given as high and low-speed simple non-condensing and condensing engines, compound high and low-speed condensing and non-condensing, and triple-compound high and low-speed condensing and non-condensing. Line J is a low-speed triple-compound condensing engine, designed to secure economy in construction rather than in fuel, and line K is a similar engine designed for fuel economy alone, while line L is an engine assumed to be operated with boilers of unusual economy, requiring more labor and is believed to represent unusually good practice. The friction of the high-speed engines is assumed at 8 per cent., and of the low-speed engines 10 per cent., making the indicated horse power 542 for the high-speed and 556 for the low-speed engines, or 500 net horse power. The pressures assumed are 100 gauge pressure in the lowest case to 150 to 170 pounds for the triple engines. The water per horse power per hour is determined from a careful consideration of the average conditions of practice. It is possible that in cases of very favorable condition the figure on the line below, or the average between them, may represent some special case. Engines in cotton mill work, with a reasonably steady load, will necessarily give the better results than if the load was not steady.

In estimating, the cost of the engine constructed and ready for operation may also vary under different conditions, but a very exhaustive study of the subject was given and the results confirmed by the conclusions of other and independent engineers. It is possible in a variety of ways, as by using smaller engines and increasing speeds, to reduce this item, but it would be beyond the customary limits. To the cost of the low-speed engine is added the main belt and the jack shaft, to bring it on the same comparison as the high-speed engines.

The column for boilers includes them erected and connected ready for operation on a basis of \$22 per commercial horse power for steam pressures under 125 pounds, and \$25 for higher steam pressures. The commercial horse power is based upon an evaporation of thirty pounds of water per hour, so engine A would require 596 commercial horse power and engine L but 259 commercial horse power, because less water is required to produce this horse power. In selecting the type of boiler it was determined to make it high enough to include the better class of "safety boilers." Horizontal tubular boilers are lower in price, but the effect of such reduction upon the cost of operation would be very small, but might be put at \$5 less a commercial horse power in the construction cost. The column cost of buildings and chimneys is based upon actual cost of various chimneys in actual practice, and upon the cost of comparatively cheap buildings to cover the boilers and engines. The prices can be reduced by using very cheap wooden buildings, but are not sufficient to provide elaborate buildings.

The fifth column shows the total cost of construction and includes $2\frac{1}{2}$ per cent. for inspection and 6 per cent. for loss of interest during construction, a total of $8\frac{1}{2}$ per cent, which is designed to cover incidental expenses and other exigencies incidental to such important work as this. What these expenses are is readily seen, and more often than otherwise the percentage taken will be no more than enough to cover the cost.

In figuring upon the cost of operation an evaporation of $8\frac{1}{2}$ pounds of water is assumed, as much as can be depended upon in practice, except in the extraordinary case assumed in engine L. If cheap coal is used that will not give this evaporation, the results will then be as though the coal was higher priced. The cost of coal per horse-power per year of 308 ten-hour days, at a cost of \$4 per long ton, is given. The cost will be directly proportional to the cost of the coal per ton; if the coal costs but \$2 per ton, the totals in this column will be just one-half, and so on, and for a longer time will be in proportion.

In the cost per year for operating expenses is included wages based on \$3 a day for an engineer and \$4 a day for firemen, and labor incidental to passing the coal and disposing of the ashes for 500 commercial boiler horse-power. There is also included a charge for supplies and repairs, allowing 12 cents per day of ten hours for supplies, and 29 cents for repairs, a total of 41 cents for slow-speed engines, increased to 48 cents for high-speed engines. Insurance, taxes and renewals are also included. For insurance one-half of one per cent is charged, a low estimate; taxes are assumed at \$15 per thousand on three-fourths the total cost, equivalent to 1.2 per cent. The renewals for plant and buildings are assumed at 3.3 per cent, a total of 5 per cent. There is also included interest of ten per cent. on total cost of construction, the capital invested. The interest account should not simply cover the money borrowed or invested to do the work, but a percentage sufficient to pay expected dividends upon the capital. Active business men demand at least 10 per cent. on their investments. It may be they will borrow the money at 5 or 6 per cent, which the business must pay in addition to a dividend upon this borrowed money to the borrower, so that ten per cent. is not an excessive amount. The last columns in the table give the total cost of operation with all these items, and coal at \$4 per long ton, for 308 days of ten hours, and for coal at \$2 and \$3 per long ton.

An examination of these columns shows clearly that, for cheap fuel and short hours, the engines of fair economy and least cost give the most economical results when both the cost of fuel and the collateral and interest charges are considered. As the price of coal increases the more economical engines become the more economical in cost.

THE LEGEND OF SOMERVILLE MILL.

ON the crest of a ridge in Somerville, Mass.,—the gravel ridge that begins at Bunker Hill and extends westward to the cliffy edges of the Middlesex Falls—stands a quaint stone tower. Its walls, which are of rude but solid masonry, slope upward toward a rounded roof. People in the neighborhood call it the "Old Powder House," but its use as a magazine during the revolution was an accident. It was a receptacle for ammunition before the engagements at Concord and Lexington, and the British succeeded in capturing a part of its stores, although some of its contents were lodged in the bodies of the king's troops that day. Its historic interest will probably lead to the permanent preservation of the structure.

Before it had been used as a powder house, however, it was a windmill, where the farmers went to grind the grain and corn that grew where miles of houses now extend. Its position on the hill-top gave an assurance of good breezes, and the busy clack of its sails and rumble of its millstones were tokens of a prosperity that endeared the land, no less than its salubrity, to the people who were soon to spring to its defense.

It is not its Revolutionary consequence, however, by which the old mill was formerly best known. It has a legend—one of those tales that obviously have some foundation in truth, even if they are not wholly true. These traditions occupy the border-land between fact and report, and, for lack of record in a practical age, they are fading out of memory. Perhaps in the next century we shall have forgotten Rip Van Winkle, Hiawatha and Evangeline.

According to this legend, which some hold to be an established fact, the mill was a trysting place for two lovers: a sturdy young farmer of the neighborhood and the daughter of a man who, as fortunes ran in those days, was well-to-do and a little purse-proud in consequence. The father objected to the union of his daughter with a man of plebeian state, but many an evening, unknown to him, his daughter met her swain on the hill-top when the mill had folded its wings for the night, and together they watched the coming out of the stars, and heard the frogs pipe in the marshes of the Mystic down below.

At last these meetings came to be heard of, and the parent sternly forbade the girl to go to the mill again; but, as she felt that she owed her lover an explanation of the cause for her discontinuance of the tryst, and

undoubtedly wished to agree upon some place where they could meet with greater safety, she resolved to go again that very night, see him for just a moment and hurry back before her absence was noted; but time flies so fast for lovers that the moments sped on into hours. The old man was not long in discovering the absence of his daughter from the house, and, as he knew there was no reason for her leaving it, except to seek her lover again, he exploded into violent language, and, clapping on his three-cornered hat and grasping his oaken staff, he set off after her.

It was an October evening, with half a gale of wind blowing, and big clouds mapped in slaty purples against a clear and golden twilight. He trudged on, muttering to himself, heeding nothing of the freshness of the evening or the beauty of the foliage, striking his heavy cane into the ground at every step, as if in doing so, he was pinning the young farmer to the earth.

In the doorway of the mill, in that sweet privacy that makes lovers shrink from light, the young couple stood, taking their farewell. A click sounded along the path, and presently they heard a voice grumbling, puffing and cursing. The girl looked down and exclaimed: "My father!"

"What right has he—" the young man started to say, but the maiden clapped her hand upon his mouth.

"Not a word!" she commanded. "We must not be seen together. If I set out to run he would know my figure. You can stroll quietly away, alone, and I will climb into the loft. Quick!"

The lover did as he was bidden, but the flutter of the girl's dress as she passed in at the door did not escape her father's eye.

"Aha!" he cried. "I have thee, Jezebel!" And he hastened forward.

Much as she had been about the old mill in the daytime and in the twilight, the girl was by no means confident that she could gain the loft in safety by the narrow, unrailed stair, nor had she time to think what might occur after she had got there. Her only idea at the moment was to escape her father's wrath, and in the dread of being overtaken she hardly knew what she was doing. She gained the loft, however, just as he came storming in. There was a moment's pause, for, until his eyes had grown accustomed to the darkness, the old man could not get his bearings. Presently he began moving across the floor, feeling his way by taps of his cane, and the girl, who was listening at the head of the stairs instinctively shrank back. Her foot caught against a loose board as she did so, and she stumbled, but throwing out her hand to save herself she caught at a rope and regained her footing, by an effort. The rope was not firm, at least it was drawn down by her weight for a foot or so, and as she released her hold upon it there was a sound as if the wind without had suddenly redoubled in strength; at the same time there was a clanking and a grinding,

down below, that told her that the cord on which she had pulled was the one that set the great fans in motion.

Hardly had the mechanism begun to move before she heard her father fall heavily. He uttered a great curse, but it terminated in a cry that rose higher and higher. It was a cry so full of pain that she ran down the stair—she never knew how—called to her lover, who was not far away, in fact, he was lingering at the other side of the mill, ready to spring to the rescue in case the old man so far lost his temper as to strike her. It was a rescue of a different and wholly unexpected kind to which he was summoned, for, in his groping, the old man had reached one of the big mill-stones just as the sails began to revolve. The jar threw him down, and his arm, caught between the grinding surfaces, was ground to a pulp.

He was removed to his home at once; everything was done for his comfort and recovery; but it was of no avail, and in due time he gave up the ghost. Before he died he saw the folly of his conduct—for there was nothing against the suitor except the fact that he earned his living—and he sanctioned the marriage of the young people that he had lost his life in trying to part; yet, such was the grief of his daughter, to think that she had been instrumental, though innocently, in causing his injuries, that the wedding was long deferred, and she avoided the mill as a place of bitter memories thereafter. The people noticed her feeling toward it, and they began to whisper it about that it was caused by the appearance there, at twilight, of her father's ghost, that went about using such strong language that it set blue lights to dancing all through the building.

C. S. Montgomery.



THE STONE STREETS OF BELGIUM.

OWING to the numerous quarries existing in Belgium, very little else than stone is employed in paving the streets and highways, in and around Brussels. A few streets in the center of the city, as well as the sidewalks of the railway stations, are paved with condensed asphalt, coming from Val de Travers. On account of the peculiar situation of the city, the majority of the streets are of too precipitous an incline to permit the successful condensation of asphalt. Wood paving is employed on some of the boulevards.

Streets destined to receive asphalt are constructed in the following manner: The soil is removed to a depth of six inches, the ground then leveled into shape, preparatory to receiving a deposit of concrete, composed of Portland cement and gravel, upon which the asphalt is applied to a depth of two inches. The method of laying wood pavement is similar to that employed in the United States.

Primary preparation of streets to be paved with stone is identically the same as when asphalt is employed. A deep bed of sand is, however, deposited instead of concrete, upon which paving stones, known as Belgian blocks, are placed in transverse rows, and firmly fixed in a smooth and comparatively compact mass, by use of a heavy paving ram worked by hand, a slight sprinkling of sand is applied and the street declared ready for traffic.

The boulevards of Brussels, forming a continuous and beautiful circuit around the city, are abundantly planted in fine, large elms, maples, sycamore and chestnut trees, affording delightful promenades to pedestrians and equestrians, as well as fine carriage drives.

The boulevards vary in width according to section of city which they traverse. They are divided into roadways for tram-cars and heavy traffic, walks for pedestrians, and roads for carriages and equestrians. The walks devoted to pedestrians are constructed from pulverized granite covered with a sufficiently deep layer of sand rolled hard and smooth, and afford agreeable promenades even in wet weather. The roads are built on similar principles as ordinary roads, that is, the ground is excavated to an agreed depth, say from ten to sixteen inches, and filled in with the paving material. The roads devoted to equestrians are filled in to a depth of sixteen inches with broken brick, which after being leveled into shape is covered with a thick bed of sea sand. The carriage roads are paved in part with asphalt, wood, and also broken and pulverized granite, the latter producing a fine, macadamized roadway.

Porphyry, per square yard, 9.50 francs (\$1.83); sandstone, per square yard, 8.50 to 9.50 francs (\$1.64 to \$1.83); asphalt from Val de Travers, per square yard, 17 francs (\$3.27); wood on concrete foundation, per square yard, 11 francs (\$2.12); the two last named pavements are highly esteemed and much employed on the boulevards.

1. Government roads under the administration of bridges and roadways (civil engineering); 2. Provincial roads, controlled by the provincial government; 3. Communal roads, controlled by the communal authorities.

Materials.—These roads are paved with native porphyry and sandstone of following dimensions: 7 by $6\frac{1}{4}$ inches, $6\frac{1}{4}$ by $5\frac{1}{2}$ inches, $5\frac{1}{2}$ by $4\frac{3}{4}$ inches, $4\frac{3}{4}$ by $3\frac{1}{2}$ by $8\frac{1}{2}$ by seven inches, $4\frac{3}{4}$ by $3\frac{1}{2}$ by 7 by $5\frac{1}{2}$ inches. Curbstone, 30 by 15 inches each side of road.

Preparing bed 12 inches deep	-	-	-	-	-	-	-	\$0.03
Ashes	-	-	-	-	-	-	-	.09
Paving stones 6¼ by 5½ inches	-	-	-	-	-	-	-	1.31
Labor	-	-	-	-	-	-	-	.04

Ashes per cubic yard 30 to 40 cents; sand per cubic yard, 48 to 58 cents. The cost of construction with rough or broken stone, per square yard is as follows:

Preparing bed 12 inches deep	-	-	-	-	-	-	\$o.o3
Rough stone, 8 inches deep -	-	-	-	-	-	-	.16
Broken stone or pebbles, 2 to 4 inches deep	-	-	-	-	-	-	.11
Labor -	-	-	-	-	-	-	.04
Contractor -	-	-	-	-	-	-	.03 ½

Total per square yard	-	-	-	-	-	-	.37 1/2
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Cost of Maintenance.—Country roads, per running yard, 4 cents; near industrial districts, 6 cents; proximity to sugar factories, 6 to 10 cents.

Roads are annually inspected and repaired as follows:

From 25 to 20 consecutive yards out of every 4,000 or 5,000 yards of pavement are taken up and replaced by new material. On roads devoted to heavy traffic, paving stones 7 by $6\frac{1}{2}$ inches are employed, as also on inclines averaging less than three-fourths of an inch per yard. On inclines averaging more than three-fourths of an inch per yard, stones $6\frac{1}{4}$ by $5\frac{1}{2}$, or heavy oblong stones $4\frac{3}{4}$ by $3\frac{1}{2}$ by $8\frac{1}{2}$ by seven, are employed. When the soil is very firm, sandstone blocks 7 by $6\frac{1}{4}$ inches are preferred, which, with heavy oblong stones, are also used on inclines according to declivity. Satisfactory drainage is produced by depositing a deep bed of ashes prior to placing pavement. On roads of light traffic blocks $4\frac{3}{4}$ by $4\frac{3}{4}$ inches are used on the level. While $4\frac{1}{2}$ by $3\frac{1}{2}$ and $6\frac{1}{8}$ by 5 inches are employed on inclines.

Contract for keeping roads in repair is by public bid, and is awarded to lowest bidder for a term of three years, the average cost of repairs to roadway 5 yards, 20 inches wide, as follows: Porphyry blocks, per square yard, 6 cents; sandstone per square yard, 5 cents. The value of land lying near or adjacent to improved roads is increased according to proximity to some large city or industrial center.

George W. Roosevelt, Consul.





THE PROPOSED NEW YORK SHIP CANAL.

CHEAPNESS of transit of the food products from the surplus producer to the consumer in our own country, and to foreign markets, as well as of the products of manufacturing and the merchandise for general trade, is a leading basis of value and of general prosperity. Nine thousand millions of dollars invested in railways in this country is a sufficient exposition of the enterprise and energy of our people in the development of facilities for land transportation. For our government to aid by all reasonable appropriations in perfecting our great free water communications and harbors for the purpose of cheapening these means of inter-trading, and of cementing closer relations of our people is, in my judgment, the exercise of one of its highest functions. The enormous growth of our internal commerce over our water lines, the increase in the size and capacity of our lake marine, made necessary by this rapid development of traffic, call aloud upon the government, with ever-growing emphasis and significance, for additional aid in giving security, facility and the element of cheapness over all these channels of commerce.

Within the past few years the interest of our government in the improvement of western waterways has been greatly emphasized, and the plans for deepening the lake connections already adopted are all that have been demanded, and all that are needed for the present growth and requirements of commerce. The completion of these undertakings will greatly facilitate and cheapen the movement of this immense inland traffic, but at the foot of Lake Erie this commerce is confronted by conditions that measurably neutralize the effect of the improvements west. The transfer charge at Buffalo, and the ratio of cost from there to the seaboard, add largely to the aggregate charge from the western port to the sea. Therefore, a ship canal from Lake Erie to Lake Ontario, in view of the near completion of other routes from the west to the sea, is what the future necessities of western commerce must soon demand. The following are some of the reasons for expecting this improvement :

While our Pacific ports are under the same flag as those of the Atlantic, it is commercial wisdom to equalize the facilities for reaching foreign markets from both shores. It is wise to forecast and ordain facilities that will give a parity of the cost of exporting the products from the north Atlantic ports with the southern, and the Pacific ports as well. The Nicaragua canal will reduce the distance from San Francisco to Liverpool 7,000 miles, and to New York about 10,000 miles. Of course this reduction in distance will also reduce the freight charge to Liverpool one-third or more. The average rate of freight on wheat from San Francisco to Liverpool is twenty-five cents per bushel, and from Australia thirty cents per bushel. Upon the completion of the Isthmus canal these rates are likely to be reduced to twenty cents and twenty-five cents per bushel or less. What are the conditions which dominate our Atlantic exportation? During the autumn of 1891, the ocean freights from New York equaled thirteen cents per bushel and the cheapest water freight to the seaboard from the lake ports, with other necessary charges, averaged ten cents per bushel. But the rail and ocean freight from Chicago and Duluth frequently costs twenty-eight cents per bushel. At present ocean rates are exceptionally low.

But northern Atlantic ports, before the completion of the Isthmus canal, will be in sharper competition with the Mississippi river. How long before the whalebacks or other sea-going vessels will take in cargoes at St. Louis and discharge them at Liverpool? The sooner the better. It is a necessity of our exporting commerce which I hail to-day with great satisfaction. Let us increase facilities and cheapen the export cost in all directions. Such an event may soon occur, and then what will equalize northern with southern export advantages? Nothing but a ship canal that will permit our vessels to transport their cargoes to the old world markets. If the Canadian government should improve her system so as to pass through her canals vessels of twenty feet draft, it could not, or would not be accomplished in ten years, and then if her present policy is a criterion for the future, our ships and our commerce would not be free, but subject to such discriminations as would give over the transportation to their own vessels. The commerce of the great Northwest and Southwest will not become contributors to such conditions.

Ultimately the ports of the lakes must supply the markets of the old world by direct exportation. *That* will be the final solution of the problem. How shall we accomplish it? The transfer of the Erie canal to the United States government and its enlargement to the required dimensions and depth, is one of the projects with which the public mind is familiar. But I do not believe the route of the entire Erie canal combines all the elements necessary to be considered in the construction of such a work.

At the request of the canal committee of the Albany Board of Trade, Mr.

Horatio Seymour, ex-state engineer and surveyor, has made an investigation of the scheme advocated by the Duluth Chamber of Commerce to construct a ship canal capable of accommodating trans-Atlantic steamers between Duluth and the sea. Mr. Seymour's investigation convinced him that the scheme, if not absolutely impracticable, would be unprofitable.

In his report he says: "The proposed ship canal would be 345 miles in length, and with thirty locks and a large number of costly aqueducts. This great sum might be expended, for the country is not to be measured in its needs, but the water supply and its control are subjects that require even more consideration than the cost.

"Mr. Sweet, in his estimate for a ship canal, estimates 200,000 cubic feet per minute for a canal one hundred feet wide at the bottom and eighteen feet deep; the canal to float ocean vessels would require much more water than this. The present water supply of the Erie canal can furnish 65,000 cubic feet per minute, leaving a deficiency even in a canal of only eighteen feet in depth, of 135,000 cubic feet per minute. Where is this supply of water to come from? There is no source that I know of except Lake Erie, and, as the water is needed to carry the boats over the level between Syracuse and Utica, the canal would have to be so constructed as to permit a flow of water continuously from one end to the other. To do this the present Erie canal would have to be elevated above the valley at Montezuma, the Jordan level cut down, the canal carried across the depression at Syracuse and the bed of the Mohawk river used from Utica to the Hudson. The difficulties that would have been encountered in carrying such a body of water through the state, with its culverts, aqueducts, bridges and locks, are very great. I do not say that it cannot be done, but I can safely say that no such work ever has been constructed."

I am in favor of a route which I believe can easily be constructed, at far less cost, and give between Lake Erie and a connection with the Hudson river at Troy a natural lake navigation of one hundred and seventy miles, including the Oneida lake, less the length of the canal at the Falls of Niagara, and which latter can be constructed on a shorter distance than the Welland canal. While I am in favor of requesting the government to make full surveys and measurements, cost of construction and relative advantages of the two routes, it is quite obvious that the route I refer to will be found by far the most expeditious and economical, and the government must be called upon to construct it, or some other connection, so that the ships of the lakes can reach the oceans of the world by a great free American route of commercial transit.

Denison B. Smith.

PENNSYLVANIA SLATE QUARRIES.

THE slate formation of Northampton county, Pennsylvania, lies along the southern side of the Blue or Kittatinny Mountain, having an average width, measured on the surface in a northwest or southeast direction, of seven or eight miles. The section given in fig. 1 shows the geological position of these deposits. Beginning at the South Mountain is seen the Archæan gneiss, the oldest of the sedimentary rocks. Above this is the Silurian limestone, which underlies in turn the slate belts. These belong to the formation called by geologists the Hudson River slates, and here they dip toward the northwest and have a thickness, perpendicular to the dip, of about 6,000 feet. Above the slate is seen the Oneida sandstone of the Blue Mountain.

The South Mountain has an elevation of about 750 feet above tide, while that of the Blue Mountain is 12,400 feet. Between them is included the Kittatinny, or Great Valley, which extends from New Jersey to Georgia with essentially the same geological formations, and which is noted for its fertile soil, its iron ores and its slate quarries.

The geological structure of the slate formation is very complicated, and in a particular quarry neither the original beds of stratification nor the planes of cleavage may be at all related to the general dip. This is due to the upheavals, overturnings and pressure to which the slates have been subjected since the period when they were deposited as horizontal layers of clay in quiet waters.

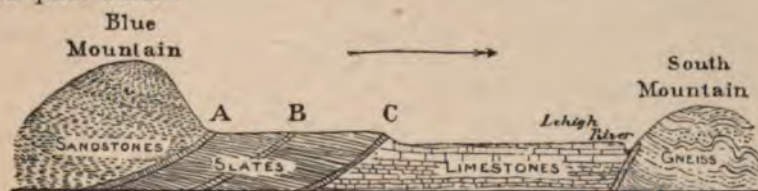


FIG. 1.

The original planes of stratification are usually seen in any quarry definitely marked by the seams or ribbons which traverse the rock in directions approximately parallel, and which differ in color and composition from that of the slate proper. The thickness of the ribbons may be an inch or two, although some are much thinner, and their distance apart varies from a few inches up to 6 or 8 feet. Between the ribbons are the beds of

original stratification, each bed being usually of uniform quality and composition, but often differing in quality from adjacent beds.

The planes of cleavage of the slate are not parallel to the ribbons, but make different angles with them in different quarries. The direction of these planes is supposed to be perpendicular to that of the pressures which consolidated the slate formation in its present position. In some quarries the cleavage planes are almost horizontal, but usually they dip toward the southeast with inclinations varying from 5 to 50 degrees.

In fig. 2 is shown a typical view of a vertical section of the top of the slate rock where the ribbons are seen curved and the cleavage planes are parallel. In any particular quarry the cleavage is usually uniform in direction, while the ribbons are often curved and contorted and sometimes the beds are folded over upon each other.

The slate deposits near the top of the formation outcrop at A in Fig. 1, near the base of the Blue Mountain; while those near the bottom of the formation outcrop at C, several miles away from it. The upper beds, comprising those from A to B, have a total thickness of about 1,500 feet, while the lower beds from B to C are probably 4,000 feet thick or more. The upper beds produce the soft slates which are used for roofing and for school slates, while the lower beds produce the hard slates which are used largely for sidewalks and steps. In the upper beds the ribbons are soft and of inferior quality to the slate proper, so that they are generally cut out in preparing the stock for market. In the lower beds the ribbons are often harder than the slate itself and need not be excluded. The hardness of the slate is usually greater in the lower beds, these having been subjected to a greater pressure than the upper ones.



FIG. 2.

holes in the ground, half filled with water. Quarries are worked at Slateford and Portland; at Bangor, East Bangor and West Bangor; at Pen Argyle; at Chapman's, Danielsville and other localities, which produce large quantities of slate for sidewalks, roofs, blackboards, mantels and other purposes.

The slate deposits are covered with earth and gravel to the depth of

The first slate quarry in Pennsylvania was that of J. W. Williams, in Upper Mount Bethel Township, Northampton county, which was opened in 1812. The Report of the Second Geological Survey, published in 1883, mentions and partially describes nearly one hundred quarries in this country; but it should be said that many of these are merely

from 10 to 50 feet. The first operation in opening a quarry is to strip off this surface-material and the weathered outcrop of the rock. The slate is



PLATE I.

then quarried by drilling holes at right angles to the cleavage planes and blasting out large blocks. The holes are made in such positions and the

blasts so adjusted in intensity, that the blocks are only moved a few feet horizontally and are not shattered. These are broken into smaller blocks, say, about a foot or two thick, two or three feet wide and eight or ten feet long, which are hoisted out of the quarry by the derrick and then run on small cars to the shanties where they are to be dressed. The quarrymen are divided into gangs of from six to twelve men, each gang having a contract to produce a certain amount of finished slate at a certain price. The men provide their own tools and powder, apportion the different parts of the work among themselves according to their different capacities, and deliver the finished slate in the yard, the company having only to hoist the blocks out of the quarry, keep it free from water, remove all debris, exercise a general superintendence, and inspect the completed slates.

Nearly all the slate quarries in this region are merely deep holes in the rock with vertical sides, most of the working being done at the bottom of the hole. The Albion quarry may be taken as the largest in the Pen Argyle region, it being about 300x500 feet in horizontal area and nearly 250 feet deep. The photographic view in Plate 1 shows the upper part of the north side of this quarry, upon which some work is in progress at the depths of about 60 and 120 feet below the surface. The curved ribbons can be plainly seen running diagonally across the view, the one which is very prominent being a quartz vein. The planes of cleavage in the foreground are closely horizontal. Crossing the picture are seen the ropes of the cable derricks by which the slate is hoisted and run out to the banks.

The photographic view of the Old Bangor quarry, at Bangor, Pa., in Plate 2, is taken looking toward the northeast. It clearly shows the manner of working in benches whose surfaces are parallel with the plane of cleavage. As the benches are worked downward, the top is being constantly stripped off in order to allow new ones to be started, and thus the horizontal extent of the quarry is continually increased, its maximum depth remaining at about 125 feet below the original surface of the ground. This method of working in benches is peculiar to this particular quarry and can only be pursued when the uncovered area is very large. There are five of these benches, each being about 15 feet in height and from 30 to 40 feet in width. The curved ribbons showing the planes of original stratification can be faintly seen, the general direction of the curves being somewhat similar to those in fig. 2. This is the oldest quarry in the Bangor region, having been opened in 1866, and the horizontal uncovered area is now about 400 x 900 feet.

In the manufacture of roofing slates everything is done by hand except dressing the edges. The blocks delivered at the shanties are first split into thicknesses of about two inches. These are piled up in a shanty beside a workman called a splitter, who, with a wooden mallet and a long, thin chisel,

divides each into halves, and continues the process until they are reduced to the required thickness of about three-sixteenths of an inch. He then cuts



PLATE 2.

out pieces in approximate sizes, and these are taken by an assistant and squared off into regular shape and size on a dressing machine. The rock

of some quarries requires to be kept damp from the time it is first exposed until it is split into the final sizes, otherwise the cleavage becomes difficult.

Plate 3 is a view of one of the slate banks of Albion quarry at Pen Argyle, where a number of shanties and workmen with their tools are seen. On the extreme right is a large block being drawn up on a car, and a pile of finished slates is seen on the left near the engine house. The rude awnings of boards and branches protect the men from the glare and heat of the summer sun, which on a slate bank always seems more oppressive than elsewhere. The workmen of this quarry are mostly English, while at some other quarries Welshmen predominate. It seems a very simple matter to split slate, but in reality it is a trade which requires much experience.

Roofing slates are made in numerous sizes, from 14x24 inches down to 6x12 inches, the longer dimension being that which is placed parallel with the rafters of the roof. In all roofing which is properly done, a triple lap of three inches is allowed; thus, for a 24-inch slate 10½ inches are exposed, 10½ inches are covered by the slate above it, and three inches are covered by two slates above it. The amount of slate required to cover a space 10x10 feet in this manner is called a square which is the unit by which they are sold. For slates 12x24 inches it takes 114 to make a square; for those 8x16 inches, 277 make a square, and so on.

The normal product of roofing slates is called No. 1 stock, and this is entirely free from ribbons. Some quarries make second and third quality slates, called No. 1 Rib and No. 2 Rib, respectively, the former containing ribbons near one end only, so that when laid on the roof, the exposed parts are free from them. The color of the slate produced in the quarries at Pen Argyle and Bangor, which are those here specially investigated, is a permanent dark bluish gray. The color of the ribbons, however, is nearly

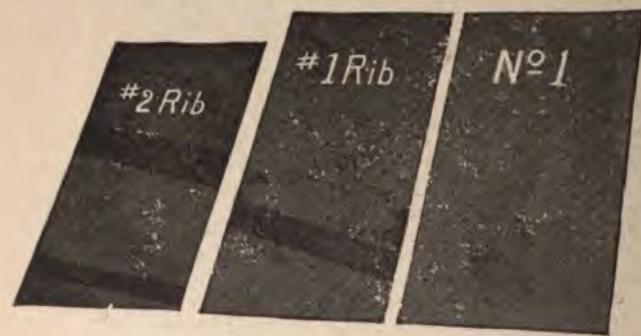


FIG. 3.

black at first, yet on exposure to the weather they exhibit a whitish efflorescence and soon show signs of crumbling and decomposition. This is due to the sulphide of iron which they contain, and also their porosity and softness. Although the price of these inferior qualities is from 20 to 40 per cent. less than that of the standard stock, they should not be allowed on a roof which is to be regarded as a good piece of work.



PLATE 3.

The roofing slates which form the subject of this paper are those from the Albion quarry at Pen Argyle, Pa., and the Old Bangor quarry at Bangor, Pa. The Albion quarry is near the top of the slate formation, and on the section in Fig. 1 would be projected near the point marked A. The Old Bangor quarry is about three miles from the Blue Mountain near B in Fig. 1, and thus at the bottom off the upper or softer slate beds. These two quarries are the largest in their respective regions, the entire product of the former, and a large part of that of the latter, being roofing slates which by general reputation stand high in quality.

The investigations of the properties of slate which are found on record are few, and these are almost entirely by chemical analysis. Silica and alumina are supposed to give strength and toughness, the carbonates of lime and magnesia are liable to be acted upon and washed out by the rain, and the compounds of iron and sulphur are known to promote disintegration under the action of smoke and acid fumes. Something as to quality can therefore be judged by the comparison of chemical analysis, but the information thus obtained is so slight as to have little weight with an engineer, particularly when he considers that the mineralogists inform us that rocks of the same identical chemical composition may have quite different properties on account of different lithiological structure. A chemical test of iron or steel affords but little information to the engineer concerning its physical properties, and he demands that quantitative results concerning its toughness and strength must be known. So it should be with stones and slates.

[NOTE.—STONE for January contained an article from Prof. Geo. P. Merrill, reviewing that portion of Prof. Merriam's paper relating to his tests, both chemical and physical, of the slate from Albion and Old Bangor quarries, presenting the tabulated results as well as Prof. Merriam's conclusions therefrom, and the essential points of his own discussion of the paper.—ED. STONE.]

COLORADO GRANITE WANTED.

Colorado granite is on the boom. Geddis & Seerie, of Denver, have received the contract of \$323,000 for granite for the government building at Omaha, and \$40,000 for the foundation for the public building at Kansas City, or a total of \$363,000.

"We will get this granite," said Mr. Geddis, "from Granite Spur, Platte canon, about thirty-eight miles from Denver. Some of this was used in recent prominent buildings erected in Denver."

"The building of our state capitol of granite from our own mountains and state, shows what Colorado can do in the granite industry and will give it a new impetus."

MAN'S MORTALITY.

[Of the following poem it is related that the original was found in an Irish MS. in Trinity College, Dublin, and that there is reason to think that the poem was written by one of those primitive bards in the reign of Diarmid about the year 554, and sung and chanted at the last great assembly of kings, chieftains and lords held in the famous halls of Tara.]

<p>LIKE as the damask rose you see, Or like a blossom on a tree, Or like a dainty flower in May, Or like the morning to the day, Or like the sun, or like the shade, Or like the gourd that Jonah made; Even such is man, whose thread is spun, Drawn out and out, and so is done. The rose withers, the blossom blasteth, The flower fades, the morning hasteth, The sun sets, the shadow flies, The gourd consumes, the man—he dies.</p> <p>Like the grass that's newly sprung, Or like the tale that's new begun, Or like the bird that's here to-day, Or like the pearled dew in May, Or like an hour, or like a span, Or like the singing of the swan; Even such is man, who lives by breath, Is here, now there, in life and death. The grass withers, the tale is ended, The bird is flown, the dews ascended, The hour is short, the span not long, The swan's near death, man's life is done.</p>	<p>Like to the bubble in the brook, Or in a glass much like a look, Or shuttle in the weaver's hand, Or like the writing on the sand, Or like a thought or like a dream, Or like the gliding of a stream; Even such is man, who lives by breath, Is here, now there, in life and death. The bubble's burst, the look's forgot, The shuttle's flung, the writing's blot, The thought is past, the dream is gone, The waters glide, man's life is done.</p> <p>Like an arrow from a bow, Or like the swift course of water flow, Or like the tide 'twixt flow and ebb, Or like a spider's tender web, Or like a race, or like a goal, Or like the dealing of the dole; Even such is man, whose brittle state Is always subject unto fate. The arrow shot, the flood soon spent, The time no time, the web soon rent, The race soon run, the goal soon won, The dole soon dealt, man's life soon done.</p>
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Like the lightning from the sky,
 Or like a post that quick doth hie,
 Or like a quaver in a song,
 Or like a journey three days long,
 Or like the snow when summer's come,
 Or like a pear, or like a plum;
 Even such is man, who heaps up sorrow,
 Lives but this day and dies to morrow.
 The lightning's past, the post must go,
 The song is short, the journey so,
 The pear doth rot, the plum doth fall,
 The snow dissolves, and so must all.

STORIES IN STONE.

TOWARD the end of the 13th century a terrible quarrel took place between the rival and neighboring republics of Genoa and Pisa. It was fought out to the bitter end. On the first of May, in the year 1285, the Genoese gained a great naval victory over their opponents. They took fifteen hundred prisoners and did much damage to the Pisan fleet. Burning to be revenged, the Pisans fitted out a new flotilla of three hundred and three galleys. In July of the same year this fleet appeared before Genoa, and the fighting men on board shot a shower of silver arrows into the port, by way of a practical hint that Pisa was anxious to renew a combat, in which no expenditure of blood or treasure would be spared.

The boastful challenge was promptly accepted by the Genoese who replied that their fleet would be prepared for action, when they would repay their neighbors' visit. Nor had the Pisans long to wait. The Genoese sailed forth and met their rivals at Meloria near Leghorn, and terribly the challengers had cause to rue their day of boasting. Eleven thousand prisoners, nearly the whole of their costly fleet, and a vast number of killed were lost to Pisa, which never recovered from the fatal blow.

Like many a beaten nation, even in later days, the Pisans cried out that they had been betrayed, and in this instance the charge seems to have been made on reasonable grounds. A contest had arisen between the leaders of the republic itself—between its highest officer, the podesta Count Ugolino della Gherardesca, and his nephew Nino Visconte, Judge of Gallura. Count Ugolino led the Pisan forces on the day which proved so disastrous for them, and it was stoutly asserted that he lost the battle purposely, in order that the strength of the republic might be exhausted, and that he himself by the help of his more immediate friends should be able to secure absolute power.

Whether this black accusation was true or false, certain it is that on the return of the count, a struggle commenced between himself and Nino Visconte, which did not end until the latter was driven from the city. Each of the combatants in turn was favored by the Archbishop Ruggiero Rubaldino; this wily churchman having designs of his own for the government of the republic. When Ugolino triumphed over his opponent he became associated with Ruggiero at the head of affairs, but the alliance was of short duration. Ruggiero took advantage of the hatred which a whisper of traitorous designs engendered against his colleague, a quarrel took place, and in the month of July 1288, he got together his adherents and attacked those of the count. Ruggiero proved victorious and after a brave but

vain effort to conquer adverse fate, Count Ugolino, his two sons and two young grandsons were taken prisoners and lodged in a tower on the Piazza delli Anziani.

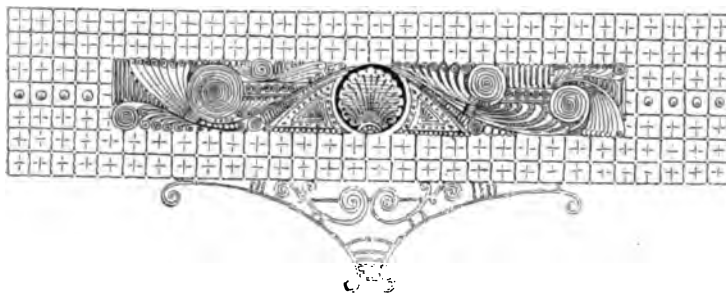
There was a horrible fate in store for the wretched prisoners. The archbishop resolved to secure himself from any danger of their escape, but was unwilling to risk putting them to public execution. He therefore conceived the fiendish idea of starving them to death. He caused the doors of the tower to be locked and the keys thrown into the Tiber, and allowed no one to approach the prison. After some days the doors were broken open and the five dead bodies were wrapped in matting and ignominiously buried. The tower was named the "Torre del Tame" (the tower of hunger) and has been so known from that day to this.

This horrible piece of cruelty was reprobated throughout the world at a time when barbarities of all sorts were constantly perpetrated. It has been immortalized by Dante in the thrilling lines thus translated by Longfellow:

"The hour drew nigh
At which our food used to be brought to us,
And I heard locking up the under door
Of the horrible tower; whereat without a word,
I gazed into the faces of my sons.
I wept not, I within so turned to stone;
They wept; and darling little Anselmine,
Said, 'Thou dost gaze so, father; what doth ail thee?'
Still not a tear I shed, nor answer made
All of that day, nor yet the night thereafter,
Until another sun arose upon the world,
As now a little glimmer made its way
Into the dolorous prison, and I saw
Upon four faces my own very aspect.
Both of my hands in agony I bit;
And thinking that I did it from desire
Of eating, on a sudden they arose
And they said, 'Father, much less pain 'twill give us,
If thou do eat of us; thyself didst clothe us
With this poor flesh, and do thou strip it off.'
I calmed me then, not to make them more sad
That day. We all were silent, and the next—
Ah! obdurate earth, wherefore didst thou not open?
When we had come unto the fourth day, Gaddo
Threw himself down outstretched before my feet,
Saying, 'My father, why dost thou not help me?'
And then he died; and, as thou seest me,
I saw the three fall, one by one, between
The fifth day and the sixth, whence I betook me,
Already blind, to groping over each,
And three days called them after they were dead
Then hunger did what sorrow could not do "

It is this fearful story which was taken by the great French sculptor, Carpeaux, to form the subject of a magnificent group, which will long be remembered as one of the finest works in the Paris exhibition of 1869. Seizing the moment when Ugolino abandons himself to despair, and "both of his hands in agony he bites," the sculptor has produced such a look of agony, such hopeless misery, and baffled rage upon a human face, as to make the very marble speak. Claspings his knees, one son implores his father to eat of his flesh and live, while the other sobbing hides his face. To the right and left, in half-fainting attitudes are the two young grandsons. On their slight bodies famine has already set its mark. The composition is worthy of the intensely tragic episode of which it is in memory. It is a poem in marble—one of the grandest stories in stone which has been created by the genius of man.

Arthur Lee.



BUILDING A WATER-TIGHT MASONRY DAM.

MR WALTER McCULLOH read a paper at the last meeting of the American Society of Civil Engineers on "The Construction of a Water-tight Masonry Dam," of which the following is an abstract: The dam described was the Sodom dam on the Croton aqueduct system, at what is known as "Double Reservoir I.," or more familiarly as Sodom and Bog Brook reservoir. This reservoir consists of two basins joined by a ten-foot circular tunnel 2,000 feet long, through which the water passes from the basin, which has the larger water-shed, into the Bog Brook basin, which has only $3\frac{1}{2}$ square miles of water-shed, with a storage capacity nearly as great as the former which drains 73.42 square miles. The combined storage capacity obtained in this manner is 9,500,000,000 gallons. Sodom dam, which impounds the water in the larger basin, is of masonry throughout, and the Bog Brook dam is of earth only. The Sodom dam spans a gorge and is 500 feet long at the opening line, which is 78 feet above the river-bed.

Examinations at the site were made by test pits and borings in 1886. The dam crosses the valley at right angles to the stream which here flows to the north, and at the site adopted the hill to the east showed an outcrop of hard gneiss rising abruptly 30 feet above water, with boulders and gravel at its foot. The rock back from this rose about 40 feet in 100, and was covered with a few feet of soil. The slopes on the west side were 15 per cent at water surface, diminishing to 5 per cent at top of dam, and the rock, which was from 4 to 10 feet below the surface, was decomposed and shaly for a depth of about 15 feet. The rock in the river-bed was solid and was over-laid by a light deposit of sand and gravel. The ridge to the east, below the site of the dam, was parallel to the river and about 75 feet above it, and a dam of earth 600 feet long was constructed upon it to the height of the masonry dam, and at the north end of this earth dam is the spillway dam, which is a masonry wall 8 feet high and 500 feet long, with the lip 10 feet below the top of coping of the Sodom dam and 6 feet below the flood line. After passing this the waste-water follows through an old water-course in a channel cut to the rock and between curved retaining walls.

The greatest height of the dam (above rock) is 98 feet, the thickness at bottom is 53 feet, and under the coping 12 feet. The total batter on the lower face is 37 feet, decreasing from 9.3 in 10 to 2.7 in 10. The batter on the back is 10 per cent up to 38 feet below the top and plumb above that

point. The gate-house is 37x42 feet and rises 23 feet above the dam near the center. The discharge is through two 48-inch pipes, which pass through the body of the dam. The work was begun February 22, 1888, and completed and accepted October 31, 1892, nearly three years after the date fixed by the contract. The floods in the stream rise suddenly and the discharge in a spring freshet reaches 250,000 cubic feet per minute. To control this during construction, a timber crib dam was thrown across the river about 80 feet above the site of the work and a canal cut 26 feet wide and 15 feet deep on the west side and around the work to a point 500 feet below. The gatehouse and eastern half of the dam were then built to about 25 feet above the discharge pipes, and in the dry season of 1889 the water was turned through the pipes and the other half of the dam started.

In preparing the foundation all loose rock was removed by dynamite, and afterward all loose seams or shakes by blasting with black powder and barring out. The foundation was swept with wire stable brooms and washed clean. All pockets or holes were then filled with rich Portland cement concrete. A tighter bond, it was found, could be made with rubble consisting of small stones than with concrete beds. Water entered through several seams in the rock and would wash the mortar out of the concrete, but it could be led around the rubble beds until finally a small well 2 feet in diameter and 1 foot deep was formed at the point where the water boiled up. After the mortar had set the well was bailed out and filled quickly with dry mortar. On top of this a bed of stiff wet mortar was laid and capped by a large rubble stone. After the first six feet of rubble foundation had been placed there was no further trouble.

The dam for about 40 feet of its height is of rubble masonry laid in Portland cement mortar mixed 2 to 1. Above this there was facing stone, 30 inches deep, laid in 2 to 1 Portland cement mortar, backed with rubble in mostly 2 to 1 mortar. The rubble stones varied from a cubic foot to a cubic yard in bulk, and were laid in full beds of mortar. There were no through horizontal joints. Joints were filled with mortar, into which as many stone spalls were forced as was possible. All stone was marked before using. Sand and cement were mixed dry, and then wet only when required. All cement passed through a sieve of 10,000 meshes, and was carefully tested. All loamy sand was rejected. The face stone was a light bluish gray limestone, cut rectangular, with rock face. Stretchers were 3 to 6 feet long by 30 inches wide, and headers 4 feet long. The thickness of courses diminished from the bottom up. The beds were at right angles to the face, and the stone had to be held in place with wooden blocks and wedges, to prevent slipping until the mortar had set, after which the blocking was removed and spaces left were filled with rubble. The dimension stone was brought by rail from Wilmington, Del.

Stone setting was done by the use of the cable, the traveler and derricks. The cable consisted of a $2\frac{1}{2}$ -inch steel-wire cable, stretched over and parallel to the dam, and over towers 667 feet apart, and anchored in the bedrock. On this a trolley ran, which was worked by a double-drum reversible engine. A load of 10 tons would sag the cable 25 feet with a clearance of 5 feet above the coping. Most of the excavation was removed, and all material delivered on the wall in this manner. The cost of the cable erected was \$3,750. The first cable, after 15 months' use, parted without warning under a load of six tons, the break, in the author's opinion, being probably due to unequal wear at the point where stone and cement were hoisted. The towers were then raised 10 feet, so as to lessen the tension, and a new cable supplied, which lasted until the completion of the work. When the wall had reached a point 31 feet below the top, the standing derricks were replaced by a traveling derrick, mounted on a 30-foot trestle and running on a track of 36-feet gauge; a boom 55 feet long was used with this derrick.

The most serious flood occurred in November, 1889, when 3.8 inches of rain fell in 18 hours, and 8.7 inches during the month. In eight hours after the rain had ceased, the water rose to 10 feet behind the dam, and in 12 hours to 15 feet, and poured over the top of the dam, although both 48-inch pipes were discharging to their full capacity. No serious damage followed, as part of the dam over the channel was kept 4 to 5 feet lower than the balance of the wall.

The final estimate for dam and appurtenances was \$436,499. The lowest bid received at the letting was \$366,990; the highest, \$583,315, and the engineers', \$540,030. The difference between the bid and estimate was due to modifications in the plans.

The dam is water-tight. With 68 feet of water behind it, no leaks whatever have been found, either through or under the wall, or around the ends. Sweating at the joints appears at points, but not so much as to cause a trickle; and it cannot be seen on a dry day. This very desirable result is due to the excellent materials used, the care in preparing the foundation, thorough cleaning of all stone, care in mixing mortar, breaking of joints horizontally and vertically and close attention by the engineers to every detail. In addition to this, the desire on the part of the contractors to do good work and the existence of a proper relationship between them and the engineers were factors.

POLYCHROME IN SCULPTURE.

IT is well known that the ancients occasionally added color to their statues. The colors employed were probably never intended to increase the resemblance of the object to nature, but they served to insure distinctness or were merely for ornament. The gilding of the hair, for instance, however objectionable, would not be condemned on the ground of its being too close an imitation of real hair. So also the color which was sometimes appropriated to the statues of Mercury, Bacchus and Pan would never be mistaken for flesh. Sometimes the accessories only were colored. An epigram, ascribed by Heyne to Virgil, alludes to a statue of Amor with parti-colored wings and a painted quiver. But the mixed materials of some of the statues even of Phidias, the gems inserted for eyes and the silver nails of other figures, all indicate a practice which the taste of modern artists condemns, and which was perhaps condemned by the ancient sculptors also. In many cases religious devotion may have interfered to decorate a statue, as paintings of the Madonna are sometimes adorned with real necklaces and crowns. In the instance of the chryselephantine statue of Minerva by Phidias the Athenians insisted that the materials should be of the richest kind. Notwithstanding these facts and the difficulty of altogether exculpating the artists, it is quite certain that it was impossible to carry further than they did those judicious conventions in sculpture which supply the absence of color. It may, therefore, be presumed that such supposed absence of color was with the ancients an essential condition of the art, and it will appear that this condition materially affected its executive style.—*The Architect, London.*

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STONE PRODUCTION.—IX*

MONTANA.

Granite.—Granite was produced from a single quarry in Lewis and Clarke counties in comparatively small amount. It was entirely used for building purposes.

Limestone.—Limestone was produced to the value of \$24,964 from four quarries situated, in order of their values, in Jefferson, Missoula, Park and Cascade counties. Sixteen thousand dollars worth of the product was used as flux and a small quantity for burning into lime, and about \$8,000 worth for building purposes.

Sandstone.—Six quarries at various localities in Deer Lodge, Cascade, Custer and Yellowstone counties produced sandstone valued at \$31,648. It was entirely used for building. About half the product came from Deer Lodge county.

NEBRASKA.

Limestone only was produced in this state. The value of the output was in 1889, \$207,019, including the value of lime produced from it. The productive counties are as follows: Cass, \$148,567; Gage, \$24,552; Sarpy, \$13,339, and smaller amounts from Nemaha, Jefferson, Pawnee and Thayer. Ninety thousand five hundred and forty-two dollars worth were used for building; \$86,643 for street work, while for flux and bridge work smaller amounts were used. The product comes entirely from the southeastern part of the state.

NEVADA.

This state produced very small quantities of granite and sandstone.

The granite came from Washoe county. The sandstone came from Ormsby county.

The product of this state was sufficient in amount for nothing more than building and street work in Carson City, to which probably the most of it went.

NEW HAMPSHIRE.

Granite.—The granite produced in this state in 1889 was valued at \$727,531. The entire southern and middle parts of the state with the exception of Belknap county, were productive of granite. There are seventy-eight quarries in the state, operating in the following counties: Carroll, \$197,284; Cheshire, \$189,590; Hillsboro, \$182,847; Merrimac,

*Report of United States Geological Survey for 1889-90.

\$112,853; Strafford, \$22,535, and smaller amounts in Grafton, Sullivan and Rockingham counties. Of the total product an amount valued at \$324,567 was devoted to building purposes; to street work, \$252,256. Of this latter value \$87,569 was the value of the output of paving blocks. To cemetery and ornamental work an amount valued at \$135,029 was used. For bridge and miscellaneous purposes an amount valued at \$15,679 was used.

A resident of New Hampshire has developed a new use for granite, which consists in finely crushing the stone and afterwards molding it into the desired shape, and by the action of heat it is hardened and made to resemble closely the original granite, and it is said that to all appearances it is as strong and durable. Nothing can yet be said of the real value of this process, but experiments are yet being made.

Sandstone.—A trifling amount of sandstone, which, however, was entirely used for abrasive purposes, was produced in Grafton county in 1889.

NEW JERSEY.

Granite, sandstone, limestone, slate, and bluestone were produced in this state in 1889.

Granite.—The total value of the granite produced in New Jersey in 1889 was \$425,673. It came mainly from the northern and northeastern parts of the state, and the markets for it are largely New York City and Jersey City. The productive counties, in order of importance, are as follows: Somerset, \$86,250; Hudson, \$81,500; Essex, \$79,200; Sussex, \$52,000; Passaic, \$37,760; Mercer, \$27,513; Hunterdon, \$24,800, and smaller amounts in Union and Morris counties. There are in all twenty-three productive quarries. Of the total output an amount valued at \$236,310 was devoted to street work, including the value of all paving blocks produced, which amounted to \$168,555; to general building purposes an amount valued at \$42,175; for bridge, dam, and railroad work, \$147,063. A trifling amount was devoted to cemetery purposes.

Sandstone.—Sandstone was produced in 1889 to an amount valued at \$597,309. It came from twenty-six quarries, scattered over the following counties, named in order of importance: Essex, \$270,450; Hunterdon \$173,007; Mercer, \$77,652; Passaic, \$63,200; and Somerset, \$13,000. The amount devoted to building purposes was valued at \$486,788; for bridge, dam, and railroad work the amount used was \$100,521.

Limestone.—The value of the limestone output of New Jersey in 1889 was \$129,662. It came from thirty-three quarries operated in the following counties; Sussex, \$72,529; Hunterdon, \$37,378, and smaller amounts in Warren, Somerset and Morris counties. The value of the lime produced was \$90,406; for flux an amount valued at \$29,620 was used, and a trifling

amount for building. The following is an analysis of Hunterdon county limestone:

ANALYSIS OF HUNTERDON COUNTY, NEW JERSEY, LIMESTONE.		Per cent.
Carbonate of lime.	53.643	
Silica.	2.100	
Carbonate of magnesia.	40.750	
Alumina. ....	.252	
Oxide of iron. ....	.798	
Total	97.543	

This lime is especially valuable for fertilizing purposes.

Slate.—A small quantity of slate was produced in Sussex and Warren counties, New Jersey. Most of it was used for roofing purposes.

Bluestone.—Bluestone similar to that obtained in Pennsylvania and New York, and used mainly for flagging purposes, was produced in small quantities in Hunterdon and Sussex counties in 1889.

NEW MEXICO.

The kinds of stone produced in this territory in 1889 were sandstone and limestone. The former was valued at \$186,804, the latter at only \$3,862.

Sandstone.—Sandstone was produced at eleven different quarries situated in the following counties, named in the order of their relative importance: San Miguel, \$139,124; Santa Fe, \$19,800; and Rio Arriba county, \$14,100. Small amounts also were produced in Valencia and Lincoln counties. Nearly the entire product was used for local building purposes, a very small quantity being devoted to street and bridge work.

Limestone.—The small limestone output was obtained from the following four counties: San Miguel, Lincoln, Sierra, and Santa Fe. The product was mostly burned into lime for local consumption.

Riccolite.—This name was given by Mrs. L. J. Cadwell, of Chicago, to a stone now quarried in the western part of Grant county. It resembles Mexican onyx, but is quite different in composition. It is susceptible to a very high polish, and is of a variety of colors. It can also be carved, and in this respect, as in others, differs from the Mexican onyx.

[TO BE CONTINUED.]

William C. Day.

AN IMPORTANT ORGANIZATION.

IN March STONE we noted the organization of the Northern Ohio Stone Co., a consolidation of several quarries operating in that section. On April 13 another company to be known as the Mussey Stone Co., was incorporated with a capital stock of \$500,000 by Henry E. Mussey, E. K. Mussey and Reno F. Mussey, of Elyria; Albert H. Johnson, of Oberlin, and George A. McArthur, of Cleveland.

The organization owns and controls some 300 acres of quarry land in northern Ohio located at Elyria, South Amherst and Grafton. The Elyria quarry is now in full operation, producing all kinds of block, flagging curbing and grindstones, but the company is now negotiating with a view of largely increasing its production of building stones at that point by the addition of new machinery. It will also proceed at once to open up its Amherst quarry and will equip it with the best and most modern machinery, and within a very short time it will be in position to meet all and any demand made upon it by the trade for Amherst buff and blue blockstone, making a strong specialty of buff Amherst stone.

We are not advised as to the officers of the company, but it is known that Mr. Henry E. Mussey, who is a well-known banker, will keep his weather eye on the great concern and will be of great service to it, by giving it at all times his kindly advice and encouragement, while his son, Eugene K. Mussey, who has had over twenty years' experience in the grindstone business, and who is well known among grindstone consumers in the United States and Canada, will have entire charge of the grindstone department of the new company.

Associated with it in an official capacity will be Mr. George A. McArthur, who was connected with other old companies for twenty-one years and who will have entire charge of the building stone department and who has a large number of acquaintances and friends over the Union among architects, contractors, stone-cutters and consumers of stone.

IN RECEIVER'S HANDS.

The Chattanooga Marble and Stone Company has gone into the hands of a receiver. A general creditors' bill was filed against the concern, the complainants being the Alabama Marble and Stone Company, of Birmingham, and Tomlinson Fort, of Chattanooga. The prayer of the bill was that the court appoint a receiver to take full charge of the business of the Chattanooga Marble and Stone Company, to sell the property or to operate the mill only so that all products would be sold for cash upon delivery. Furthermore that the receiver, after disposing of the property, should settle with all the creditors pro rata. The chancellor refused to grant the prayers of the bill as a whole, but appointed J. B. Ragon temporary receiver to ascertain the exact financial standing of the company and report. The receiver has no power further than to shut down the mill and to employ a watchman to see that the property is in no way molested. After he has ascertained the exact status of the financial condition of the company he is to make a full report to the court and then other action will be taken. The company was organized June 1887. Charles E. Smith is president and general manager.—*Tradesman*.

THE VERMONT MARBLE COMPANY AT THE FAIR.

THE exhibit of the Vermont Marble Company at the World's Columbian Exposition contains two unique pieces, about five feet square, representing a section of slightly slanting rock, with projections on the surface in a number of places, a very natural copy of rocks as one may readily find by a stroll through Pine hill. On one of the pieces, cut in extra dark blue marble, is the highly polished form of a snake, about twelve feet long, coiled in a picturesque way and arranged so as to show that it has just emerged from a hole in the rock.

It is in quest of prey and a very natural looking frog, cut in green Brocadillo Rutland marble, with its back to the



snake, furnishes the object for which the snake is going to make a spring. The dull, tooled surface of the rock furnishes a fine background for the snake and its intended victim. The other piece represents an alligator preparing to make a meal of a fat pug dog and is perfect in design and finish.

EDITORIAL COMMENT.

THE frontispiece in April *STONE* which was an illustration of the entrance to the Toronto University, was kindly loaned us by the *Canadian Architect and Builder*. Our contemporary is one of the brightest among the many blazing stars that shine in the empyrean of architectural journalism. Its illustrations are of the rarest and best types of modern architecture, and it is edited with conspicuous ability.

THE *American Architect* is in favor of foreign marble for the new congressional library building. That is not strange. There is precious little about the *American Architect* that is genuinely American. It favors foreign marble for the library building because, it says:

As a rule, the stone in quarries improves in quality with the depth, and, unless our country is extraordinarily favored, a great deal of money must be spent in the marble states before their quarries are likely to compete with those which were hunted out two thousand years ago by the best judges of marble that ever lived, and have been worked ever since in the most skillful and thorough manner known to science.

The inference here is that American marble is not of high quality because it is not derived from the lower bowels of the earth. If that is sound reasoning it must hold against the marble which was "hunted out 2,000 years ago by the best judges of marble that ever lived," and which stands to-day exposed in the temples and monuments of Europe, because most of that came from near the

surface of the sides of hills or from coast lines. But there are quarries in Vermont 300 to 400 feet deep, while from the shallow holes of East Tennessee and Georgia marble of a quality fit to adorn the best specimens of the American public building has been taken. The more one considers this prejudice for foreign marbles for our public buildings the more inexcusable it is.

THERE is another strike on at Biddeford, Me. In this case the quarrymen are the aggressors. Messrs. Bragdon & Son forced matters to an issue by notifying the cutters, tool sharpeners and engineers that they must quit their union or leave the quarry. The question is not one of wages, but of recognition of the union. *STONE* is free to say that the operators have assumed a position not justified in reason or fairness. We do not think quarrymen may rightfully claim for themselves what they deny to their workmen. If it is wrong for the latter to organize, it is wrong for quarrymen to do so. We think it is right that both should organize while there exists a division of opinion as to respective rights. The union demands that a stated number of hours shall constitute a day's work; that the workmen shall receive a stated sum for a day's work; that they shall be paid for their work at stated times; that the workman leaving service shall give timely notice and shall at the end of the notice receive his pay; that the man

peremptorily discharged shall receive pay due him within twenty-four hours from time of his dismissal. The workmen are reasonable in such demands. When they go no farther than this the operators might consent to recognize them, without the risk of a particle of their good sense or business advantage. The operators, by conceding such demands, would strengthen their own requiring that they shall be the sole judges of the qualifications of their workmen; that the men of responsibility in their employ shall be of their own selection, whether of the union or not; that their running contracts shall not be jeopardized by sudden strikes; that by consenting to the union's demands in the matters set forth they shall be defended in the loyalty of their employes when they are menaced by unfair competition. There's an easy roadway leading into Peaceful Valley. It is always a rocky road up the hill of Obstinacy.

PRELIMINARY surveys have been completed for the proposed Indianapolis, Bloomington and Bedford Railroad, which is intended to serve as an outlet to Indianapolis for a large section of stone land in southern Indiana. It passes through the heart of the oolitic district, and when completed will afford facilities long needed to market that famous stone, the demand for which is increasing enormously. The projected line is eighty miles in length and has been subsidized by Monroe county to the amount of \$72,100, while other countries will doubtless vote the necessary aid to insure the early completion of the road.

THE World's Fair should be open on Sunday! The World's Fair should be closed on Sunday! If it is the law, let the first proposition stand though the Fair falls! If it is only Sabbatarian sentiment that stands in the way of open-

ing, let the gates swing outward! The world has passed the sentimental era. We are in the educational. We are having to do with the severely practical affairs of life. Sabbatarianism is a sentiment. It is nourished on dry rot. Education is the mother of progress. It is sanctified by love of liberty. It is claimed congress passed an act in recognition of a sentiment. That act, it is further claimed, is a protest against the liberties of the people. It has not been judicially interpreted. Should the World's Fair commissioners beat about for an avenue of escape from the consequences of its enforcement? That would be a mild form of anarchy. Law is of the people. "Let the voice of the people be heard" came from the strangling throat of an anarchist, once upon a time. It is not difficult to learn what the law is, though few of us may be able to interpret it. What have the courts to say of the Sunday-closing proviso in that act? Why may not their seal be set upon it quickly? An emergency exists that affects the rights of the people. May the congress recognize a sectarian sentiment in the enactment of a law commanding the tributes of the people? Let that question be settled. We do not doubt the power of any legislature to pass upon moral principles involved in legislation. But this Sunday-closing sentiment is not a moral principle any more than is the opposing sentiment that demands that this educational exhibition be free to be enjoyed as the people will. It was right that congress should appropriate the people's money to aid the people's Fair. We doubt its right to make the condition that that money should not be applied if the Fair were opened on the Christian's Sabbath, any more than on the Jew's or Moham-medan's.

LEGAL NEWS AND NOTES.

Lien for Freight.—In the case of the Miami Powder Co. v. Port Royal & W. C. Railway Co. the Supreme Court of South Carolina held, that where an owner of goods ships them from one point to another through the hands of a common carrier, there is no change in the ownership of the goods, and the only interest the carrier acquires in them is a lien for such freight and charges as may be due at the point of destination.

Negotiable Instruments, Transfer after Dishonor.—In the case of Reed v. Stapp the U. S. C. C. of App. held, that where one pays the note of another to a bank, and has the bank cancel the note, and deliver to him a dishonored certificate of deposit, held by it as collateral security, which certificate he takes as collateral security, for a new note given to him by the debtor, he takes the certificate subject to equities existing against the original payee, even though the bank was an innocent holder for value before dishonoring.

Misconduct of Agent.—In the case of Thurber v. Cecil National Bank, U. S. C. C. held, that where an agent, pursuant to the order of his principal, loaned money on a pledge of personal property, taking warehouse receipts therefor in his own name as "agent," which he pledged to secure his individual debts to a bank having knowledge of the business relations of the principal and agent and the operations in which they are engaged, this knowledge, together with the use of the word "agent" on the receipts, was sufficient to put the bank upon inquiry, and it was liable to the principal for the amount realized by it from the sale of the goods so pledged.

Principal and Security.—In the case of Shufelt v. Coolidge the Supreme Court of Michigan held, that when a judgment was obtained on a note made by M, principal, and C, security, C refused to become security on another note to obtain money to satisfy this judgment, unless some one else would sign with him, which

at M's request S consented to do; C was not a principal debtor on the note given for the judgment debt, but he and S were equally liable as co-securities.

Negotiable Instruments Indorsed.—In the case of Rhodes v. Jenkins the Supreme Court of Colorado held, that where a bank drew a draft in favor of one of its customers, and sent it to him by mail, and the draft fell into the hands of another of the same name, and he, by the aid of defendant's indorsement, secured payment on it, the defendant by his indorsement became responsible for all former indorsements, and that he was liable.

Negotiable Instruments Signed in Blank.—In the case of Geddes v. Blackmore the Supreme Court of Indiana held, where one signs a printed blank form of a note, and delivers it to another, with verbal instructions to purchase certain merchandise, and to fill the blanks in the note and give it in payment, such signer is liable though the one to whom he delivers the note disregards his instructions and uses it to borrow money for his own use.

Principal and Agent.—In the case of Ross v. Clark the Supreme Court of Colorado held, that where an agent is authorized by his principal to make a certain contract for purchase of a property, and makes a contract differing from the one authorized, in that it requires a larger cash payment, and a larger installment the first year, such installment is not enforceable against the principal, even though the purchase money be smaller, and the agent cannot recover from his principal a deposit made by him on the unauthorized contract.

Sale—When Title Passes.—In the case of North Pacific Lumbering & Manufacturing Co. v. Kerron the Supreme Court of Washington held, where logs sold on contract for delivery at a specified place were not cut when the contract was made, the title thereto does not pass until after delivery, and a mortgagee thereof before delivery will hold the same, as against such purchaser.



BOOKS AND PERIODICALS.

The Century Company will show in their exhibit at the Columbian Exposition a great number of interesting original manuscripts and drawings for important illustrations in *The Century* and *St. Nicholas*. Manuscript poems by Tennyson, Longfellow, Whittier and Bryant will appear in the *St. Nicholas* exhibit, with the manuscript of the first chapter of "Little Lord Fauntleroy," by Mrs. Burnett, and original stories by other well-known writers. The originals of famous letters and documents quoted in Messrs. Nicolay and Hay's "Life of Lincoln" will be shown, including a certificate of a road survey made by Lincoln in 1834, with bill for his services at \$3.00 a day, the letter of the committee apprising Mr. Lincoln of his first nomination for the presidency and his reply, the corrected copy of the inaugural address from which he read, March 4, 1861, the original draft of his proclamation calling for 75,000 men, drafts of important messages to Congress, as submitted to the cabinet, Mr. Lincoln's written speech on presenting Grant his commission as lieutenant-general, and the autograph copy, in pencil, of General Grant's reply. Letters from General Grant to the editors of *The Century* regarding his papers for the War Series—the last from Mt. McGregor—will be exhibited, with original manuscripts by General McClellan, Joseph E. Johnston and others.

The Century Company will show also how an illustration is prepared for the magazine, from the artist's drawing to the printed page, by wood-engraving, and by various photo-engraving processes; how the "Century Dictionary" was made, with copies of the earliest English dictionaries, and manuscripts and proofs of the "Century Dictionary" in various stages. This exhibit, with that of other publishers, will be found in the north gallery of the Manufactures and Liberal Arts Building.

The larger number of pictures in the May *Popular Science Monthly* is the first feature to arrest attention. The number opens with a charming account of Japanese Home Life, by Dr. W. Delano Eastlake, which has many characteristic illustrations. There is also a description of the Oswego State Normal School—one of the best institutions of its class—by Prof. William M. Aber, with views of class-rooms and laboratories, and portraits of instructors. Prof. Byron D. Halsted contributes an illustrated article on the practical subject: Decay in the Apple Barrel, and Prof. G. F. Wright defends his recently attacked book in an article under the title Evidences of Glacial Man in Ohio, also with many illustrations. The able argument by Herbert Spencer on The Inadequacy of Natural Selection is continued in this number. Mr. G. W. Littlehales, of the United States Hydrographic Office, describes the growth of our knowledge of the deep sea. Prof. Wesley Mills advocates the Cultivation of Humane Ideas and Feelings. P. E. M. Berthelot recounts The Discovery of Alcohol and Distillation. How Science is helping the Farmer is told by Prof. C. S. Plumb. Other articles are Dietary for the Sick, by Sir Dyce Buckworth; a Tribute of the French Academy to American Geological Exploration, and a sketch, with portrait, of Prof. Samuel William Johnson.

The May *Overland Monthly* contains its usual bright and fresh Western stories and sketches. The most important of the more serious articles are a paper on Architecture in San Francisco by Ernest C. Peixotto, illustrated from photos and from sketches by the writer, Some Realism Regarding Silver, F. I. Vassault. The latter is refreshing for its common sense dealing with the evidences of history of silver coinage in the United States, apart from speculations on abstractions.

Several very clever stories and sketches appear in this number. A Hypnotized Ghost, by F. Edmund V. Cooke, is an amusing story of supposed supernatural and hypnotical phenomena. Jose and Teo, by Frank Bailey Millard, is a pathetic story of Santa Barbara life, beautifully illustrated.

The poems of this number are very good and prettily illustrated.

The *Review of Reviews* for May will be found as strikingly original and individual in its character as any previous issues of this enterprising periodical. It strikes out into a fresh field with Mr. Stead's magnificent character sketch of Frederick Selous, the great African traveler and hunter—the greatest Nimrod, in fact, that this world has ever produced. Mr. Stead makes a marvelously interesting chapter of exploits with lions, elephants and other large game in the heart of Africa, and also shows in his own peculiarly virile and fascinating way how vitally the work of a great hunter like Selous may associate itself with the advance of civilization and with the enlightenment of the Dark Continent.

Worthington's Illustrated Magazine came to hand with a generous supply of good things for the entertainment of its rapidly growing circle of readers. The April issue opens with a timely paper upon "American Warships of To-day," by Hon. S. G. W. Benjamin.

Another article of absorbing interest is, "The Glaciers of Alaska," by the enthusiastic geologist, Prof. G. Frederic Wright, of Oberlin.

Mrs. Livermore's fourth paper of personal experiences "In Ole Virginny—Fifty Years Ago," abates not a whit in their peculiar interest.

The stories and department matter is well chosen and attractive. The special articles, stories for young people and little children, the original puzzles for those who find relaxation instead of weariness in this form of brain-work, are all such as any publisher might feel a worthy pride in presenting to his readers.

A New York daily paper, taking up the idea conveyed in Flammarion's exciting novel, "Omega: The Last Days of the World," has interviewed a number of the leading men in all professions as to what they would do if science were to predict to-morrow that the end of the world would arrive within the next thirty days.

The answers are various and curious, and heighten the interest which is felt in the second part of Flammarion's great novel, which appears in the May *Cosmopolitan*. It is a question which everyone will find interesting to ask of himself: What would you do if within six weeks the end of the world were certain? Probably no novel which has ever appeared in an American magazine has been more elaborately illustrated by more distinguished artists, Laurens, Saunier, Vogel, Meaulle, Rochegrosse, Geradin and Chovin all contribute to the explanation of the text.

A clever story of another kind is that of the new English novelist, Gilbert Parker, in the same number. "American Society in Paris" is an article of another kind, but one which will interest all who have had occasion to make even a short residence in the French capital. The *Cosmopolitan* scores a success in producing in its May number, almost simultaneously with the daily papers, an elaborate description of Professor Gray's marvelous invention, the Telautograph, which reproduces the handwriting, or the work of the artist, simultaneously, thousands of miles distant from the place where the writer or artist is sitting. Mr. Howells' purpose in "The Traveller from Altruria" is month by month becoming more evident, and is now receiving wide attention at the hands of the critics all over the world.

As the season for out-door photography advances, the various journals devoted to this fascinating art put forth their best efforts and come to us laden with all manner of good things. So many of our readers are interested in photography, either as a pastime or as an aid to business, that we make note of some of the special features of the photographic journals for their benefit. The "old reliable" *Wilson's Photographic Magazine* now issues monthly and in its new and enlarged form well merits its title of the "best and handsomest." Its editor is a veteran in the business, being the author of several standard works on photography. The matter contained in his publication is selected with great care, and an effort is made to interest both the professional and amateur. An excellent half-tone, representing photography in colors, embellishes the May number and puts at an end all discussions relative to the theory of exact reproduction by the art of photography. Edward L. Wilson, Publisher 853 Broadway, New York.

ADVERTISERS' DEPARTMENT.

AN EXCELLENT DIFFERENTIAL BLOCK.

Dealers who have monuments to set, and quarrymen and contractors desirous of working always to the best possible advantage, will be interested in knowing something concerning Moore's Anti-Friction Differential Chain Pulley Block, an advertisement of which will be found in this issue.

It is claimed by the manufacturers that this block is a perpetual lever, always working at its most advantageous point.

The two ends of the lift chain, which are attached to the lower hook, fall from opposite sides of the lift chain wheels. The lift chain wheels are provided with internal gear of different diameter, but of the same pitch. The pinion which has teeth of pitch corresponding to that of the internal gear is loose on the eccentric, and is really two pinions of different diameters cast in one. The lifting wheels being prevented from turning together on the shaft by the weight of the load, they are separated and made to turn in opposite directions by the revolving of the eccentric, which rolls the loose pinion around the disc and causes them to move in opposite directions, owing to the difference in the ratio of the number of teeth in the two pinions and in their corresponding disc.

The manufacturers guarantee the blocks and solicit sample orders subject to the return of the blocks within thirty days, at their expense, if not satisfactory, an exceedingly fair proposition and one that should induce many trial orders.

MOVED INTO LARGER QUARTERS.

The business of the Sullivan Machinery Company of Chicago, Ill., has grown so rapidly both in volume and in lines of special machinery, which they manufacture, that it necessitated more floor space, and increased shipping facilities, therefore they have removed their office and salesroom to 54 to 60 North Clinton street, Chicago, one block north of their old location, where they will be pleased to

attend to the wants of the stone trade with their usual attention and promptness. They carry in stock, in addition to their regular line of Sullivan diamonds drills, channeling and gadding machines, a full line of coal mining machinery, including Stanley entry drivers, long wall and room and pillar undercutters, Mitchell automatic tipples, etc. Besides their completed machines, they always have on hand duplicate parts and diamond drill supplies, carbon, (black diamonds) etc., which they can supply promptly to the trade.

THE LEAD PENCIL BETTER THAN PEN.

Ex-President Harrison, whose handwriting is as clear, precise and neat as that of a woman, said, after writing his annual message with a lead pencil, "My thoughts flow more freely from the pencil." Other eminent men, who have felt the weight of great responsibilities, have been conscious of nervous irritation, mental friction and general exhaustion when using a pen, and an almost entire freedom from such ills when using a pencil with a smooth and easy yielding lead. General Grant, in writing his important papers, used a Dixon "American Graphite S M" and commended it for its unequaled qualities.

The use of a lead pencil has saved many a writer from penman's cramp, and made it possible to do better work with greater ease.

THE INGERSOLL-SERGEANT DRILL CO.

Announce that the offices of that company were removed May 1, to the Havemeyer building, Cortlandt, Church and Dey streets, New York. The old office at No. 10 Park Place will be for the present retained as a shipping department, where will be kept a stock of machinery and duplicate parts.

A large corner room has been fitted up in connection with the new offices on the Cortlandt street side on the tenth floor of the Havemeyer building, the intention being to place this room at the disposal of contractors, engineers, and all persons engaged in mining,

tunneling, or quarrying. Friends of the company who may visit New York will find accommodations here in the nature of all scientific and engineering magazines, writing paper, telephone, messenger service, directories, etc. The view from the room is unsurpassed, affording a magnificent outlook over New York City, the bay, and the surrounding country.

The location of the Havemeyer building is a convenient one, being within one block of Broadway, directly at the Cortlandt street station of the Sixth avenue elevated road, and only a short distance from the Cortlandt street ferry.

The company extends to all a cordial invitation to visit their new offices.

LOOK TO YOUR ROLLING STOCK.

True economy in the equipment of a quarry or stone plant consists in buying the most reliable and durable appurtenances. More especially is this true of those requiring frequent repairs. Wagons for hauling stone must be built in a manner precluding the necessity of being constantly overhauled, since the isolated position of quarries prevents ready access to the "smithy." We present in this issue the card of the Fish Bros. Wagon Co. of Racine, Wis., a concern long and favorably known to users of heavy vehicles. If your needs are urgent for a wagon built "upon honor" send to them for their catalogue. If you have your own ideas regarding the construction of a wagon communicate with them. In either case you will have reason to be satisfied, as regards both quality and price.

REMOVED TO SOUTH MILWAUKEE, WIS.

The Bucyrus Steam Shovel & Dredge Company, for such a long time located at Bucyrus, O., have removed their works and office from that place to South Milwaukee, Wis., where hereafter all communications to them should be addressed. The new plant was built in 1892 and is planned on the most perfect and extensive scale of any establishment of its kind in the world. The ground comprises fifteen acres, thirteen of which are occupied by the main works. The two remaining acres, which are located on the harbor on the lake shore, will be used as a ship-yard, and are connected with the main works by a belt-line railroad. The buildings are of steel, brick and glass and are heated by the hot-blast ventilating system and lighted entirely by electricity. The power is distributed from a central power-house by electricity to the various buildings and two multipolar generators each 150 horse-power driven by a cross compound Corliss engine, are employed. The machine shop and foundry are equipped with electric traveling cranes. Auxiliary cranes for the machine tools are served by compressed air and all the most improved and modern methods are used in order to insure the systematic and economic production of their machinery, which is high class in design as well as in materials and workmanship. With their improved facilities and increased capacity the company will be better able than ever to serve their patrons.

H. Channon & Co., Chicago, furnished the material for hoisting the great Ferris wheel on the Midway Plaisance at World's Fair. The blocks which were made by the Boston & Lockport Block Co. were twenty-four inch extra heavy thick mortise.

NEW ENGLAND NEWS AND NOTES.

Business at the granite quarries of Milford, Mass., is increasing with every week, and the chances are favorable for their being worked to their fullest capacity at an early date.

Huntington & Clough are putting in hoisting machinery for the working of their marble quarry at Washington, Vt.

The Clark's Island Granite Co. has consolidated with the Bodwell Granite Co., of Rockland, Me.

James Small has sold his interest in his quarry at Jonesboro, Me., to H. L. Marston and Ansel Tupper, who now own the whole, and are building a wharf, putting up a new derrick and making other needed improvements. They intend to do a good business this summer.

Business is rushing at the Fletcher Granite Works at St. Albans, Vt. They are continually increasing the force and have three months' orders ahead.

The stone business at Sullivan, Me., is very brisk this spring. Three-masted schooners and other crafts are constantly arriving for freights in paving, and the business outlook is excellent for the coming season.

The Cape Ann Granite Works, at Rockport, Mass., will, it is understood, be sold under the hammer May 17.

Gallagher's new quarry at Stockton, Springs (Me.), near the Prospect line, is now in full blast, employing about 170

men, of whom some forty are stone-cutters. Chas. Colson is superintendent of the work. Henry B. Heagan is draftsman and Mr. Calderwood foreman of the quarry. The work is six and eight-cut building stone for the upper story of the Seventy-Second Regiment armory, New York City. It is cut and boxed at the quarry and hauled to Sandy Point for shipment. The pay of the cutters is from \$2.50 to \$3 per day, and the quarrymen from \$1.50 to \$1.80. Wages are paid promptly the tenth of every month, and work enough is in sight to last the present crew until August or September.

C. H. Grant and Edward Reed have gone to South Royalton, Mass., to begin work on the quarry they opened last year. They are building a new shed and blacksmith shop, and have just secured a contract for the foundation and trimmings for a building in Athol, which will take between 300 and 400 perches of granite.

P. W. Bates, of Wall street, who recently opened a quarry in the vicinity of Peat Swamp, Conn., is in luck. While blasting in the quarry for facing stone for cellars, a ledge of light granite was exposed which Mr. Bates avers is unequaled in quantity and quality in the state, and he believes that the supply is unlimited. Mr. Bates is a man of large experience, and fully believes that he has discovered a stone forest in which

there is, to say the least, millions of cubic feet.

James Buchanan, a foreman at the quarry of the Green Mountain Granite Company at Barre, Vt., went to the adjoining quarry of James Collier, and while talking to the foreman a blast was fired, filling the air with stones. Buchanan was hit by a fragment of granite. His skull was fractured and he became unconscious. Although the physician removed eight ounces of brain and several pieces of the skull from the wound, Buchanan recovered consciousness, talked plainly and sensibly, and the only difficulty noticed is the paralysis of the left side. Dr. McSweeney said that Buchanan's return to consciousness was an unexpected thing, and if he should recover it would be an unheard of case in the annals of surgery.

The Producers' Granite Company has purchased of D. M. Miles, for \$1,200, a tract of land on Smith Meadow (Vt.), on which their new sheds are to be erected.

The Monson Granite Company, of Springfield, Mass., has commenced working its quarries and is filling a large order for rough stone.

The report sent out from Stony Creek, Conn., recently stating that the quarries at Leete's Island were to shut down owing to a scarcity of men is denied by the proprietors. There are said to be 200 men on the pay roll at Beattie's quarry. The difference between the quarry owners there and the granite cutters seems to be as far from settlement now as it ever was.

The granite business at Rockland, Me., is quiet this spring. Anderson & Connon are getting out some fine blocks of rough stock from their quarry in the 'Keag woods.

The receiver for the defunct Naugatuck Granite Company filed his report at New Haven, in the Superior Court. The report shows that the claims against the company aggregated \$17,917. Dividends \$1,250.60, a little over 6 per cent were paid to creditors. This is the company with which ex-mayor Charles R. Baldwin, of Waterbury, was connected, and which came to grief a year or so ago.

The work, at Plainville, Conn., on William Cook's \$10,000 rock-crusher is progressing rapidly. The New England road has agreed to build a spur track to the ledge and the plant will be so arranged that cars may be loaded with the greatest rapidity.

The W. N. Flynt Granite Company, of Springfield, Mass., bought a locomotive of the New York Central road, for use at the quarry.

James Maslin, a retired granite dealer and prominent resident of Lake Mahopac, N. Y., committed suicide by shooting himself. Maslin formerly lived in Hartford, Conn.

The Praneau Brothers have leased for three years the quarry of James Brown at East Barre, Vt., paying ten cents per foot for all stone quarried.

Barre, Vt., has suffered from high water. The spring flood early this month, causing considerable idleness among granite cutters, and more or less damage to property.

The Augusta (Me.) Granite Company is doing a rapidly increasing business. Nearly forty quarrymen and a large force of cutters are hard at work.

The New England Brownstone Quarry Co., of Cromwell, Conn., are shipping away large quantities of brownstone,

The Middlesex Steam Brown stone Co. has recently been incorporated for the purpose of carrying on the stone-cutting business in Cromwell, Conn., with Mr. George J. Grossman, who has for some years conducted the same business at Meriden, Conn., as president and general manager. This company will erect its buildings on property of the New England Brown stone Co. and will be equipped with machinery capable of handling, sawing, etc., any sized stone that may be desired. Contracts for buildings and machinery have already been let, and it is expected everything will be in readiness to begin business as early in the spring as the weather will permit. The shipping facilities could not be better as they have spur tracks connecting with both the N. Y., N. H. & H. R. R. and the N. Y. & N. E. R. R., also a water front, which will insure cheaper freight rates by rail and low rates by vessel to any point that can be so reached. The company starts out under very favorable circumstances, as they already have several contracts for work which will keep the mill busy for some time when it shall have started.

The New England Brownstone Co. of Cromwell, Conn., which for the past five years has successfully operated their quarries, and furnished stone for many of the fine buildings in the larger cities, have contracted for considerable new machinery, including engines, boilers and hoisting machinery, in order to increase the capacity of their plant. They have been busy since the cold weather compelled them to discontinue quarrying, in getting their rocks uncovered for next season's business, and expect to produce more stone than any

year heretofore. Although the demand for stone was not so great last year as had been hoped for, the quarry was worked to its full capacity, which left them with quite a large stock of stone on hand at the close of the season, but since that time orders for early shipments have been received and the greater part is already sold.

Dix Island, Penobscot Bay, Maine, where are located the granite works from which were built the treasury building in Washington, D. C., and the Philadelphia and New York postoffices, has changed owners, and the Dix Island Granite Company is no more. Since the close of the war this company has been composed of Edward Leonard, Pittsfield, Mass., president, and C. P. Dixon, Brooklyn, N. Y., treasurer, with the widow of the late Horace Beals as a third owner and a silent partner. Since the completion of the Philadelphia post-office in 1878 the works have been idle, and some \$75,000 worth of property, such as boarding-houses, store sheds, blacksmith shops, carts, derricks and tools, have been going to decay; in fact, word was sent out that Dix Island was a thing of the past. Now it seems that it has just begun its career as a granite giving island, for the widow of Horace Beals, the former owner, has for \$40,000 purchased the two-thirds of the island which she did not possess, and is now sole proprietor of the entire plant. Report has it that she bought the property on account of encouragement held out by Dr. Dix and others of Trinity Church, and it is said the material for constructing the new cathedral of St. John the Divine, New York's largest and latest addition to church architecture, will be quarried on Dix Island.

NOTES FROM THE QUARRIES.

H. Conner, of Mast Hope, Pa., will soon finish up his bluestone business, and go into the same business at Roscoe, Sullivan County, New York.

The stone quarries at Parkersburg, W. Va., are running full blast, four in number. The Reich Brothers will quarry an immense lot of stone this season. The McNerney Brothers are getting out some of the finest curbing ever quarried on that side of the river. The stone taken from this quarry is a hard, fine-grained stone, and is the only curbing gotten out in that community.

The Shaler & Hall Quarry Company of Portland, Conn., contemplate the substitution of electricity for steam in nearly every department of the work at their quarries.

Perry, Matthews & Buskirk, of Bedford, Ind., in order to keep pace with the growing demand for the product of their quarries recently added two new channeling machines and now two more have been ordered which will make ten in all. There will be no further difficulty in their supplying stone promptly.

Kokomo, Ind., has for many years been noted as a stone center, but not until this year have the quarrymen made any attempt to put in expensive machinery for facilitating their work.

Stewart & Carter's big crushing plant at their south side quarry is well under way, and when completed it will be one of the largest plants of the kind in the

state. They are putting in the latest and best machinery that money will buy with which they hope to be able to fill their large contracts more readily than heretofore.

Deffenbaugh & Smith have also caught the fever and are putting in a system of crushers which will crush stone to any size required, from three-inch lumps to the finest dust.

The Jasper Stone Quarry Company, of Birmingham, Ala., have their plant engaged day and night sawing stone for Memphis contractors.

The Secrest Stone Company, of Laurel, Ind., has made an assignment, due, it is said, to the precipitate action of Mosby & Hodson, of Cincinnati, in securing a claim. The liabilities are placed at \$4,000, with the assets, principally in real estate, \$50,000.

The steam grindstone works at Constitution, W. Va., blew up, killing Rolla Calder and John Spicer and injuring two other workmen. The cause is unknown.

A new town to be known as Granite is being organized at a point sixteen miles from Florence, Wis. The granite there is of three colors, grey, blue and red, and very beautiful.

The stone quarry firms of Joliet, Ills., have been compelled to lay off a large number of men on account of the scarcity of flat cars to ship the stone. The railroads have all their flat cars in use, many hauling things to the World's

Fair and a large number are assigned to the hauling of gravel to repair the railroad tracks so as to have the tracks in good shape for the World's Fair passenger trains. This has been a great drawback and has caused considerable trouble as the quarry firms have big orders which they will lose if they are not filled soon.

The Colona, (Ills.) sandstone quarries are in active operation this spring and the demand for stone promises to be greater than ever. Two additional engines have been set up and the working force of the quarries has been doubled. The deeper these quarries are worked the better the stone proves, and being right on line of the Q. road the facilities for shipment are unsurpassed.

Washington is going to beat Wisconsin in the height of its monolith at the World's Fair, provided the Tenino stone quarry-owners can get their great shaft safely transported to Chicago. They propose to cut out a block 130 feet long and weighing 300 tons. The Wisconsin monolith quarried near Bayfield, is 115 feet long. If the big Washington stone gets to the Fair the Northern Pacific Railroad will have to build three cars especially for its transportation.—*Portland Oregonian*.

Mr. Albert J. Weber, of Baltimore, who recently purchased the old Isaac quarries near Ellicott City, Md., now has them in full operation. Several acres containing valuable granite deposits, were purchased from Mr. Henry R. Hazlehurst, in addition to the above. Much of the stone will be converted into Belgian blocks. A large stone crusher is at work and quantities of the crushed stone will be furnished for the roads in the first district of Baltimore county.

The commissioners at Washington, D. C., have accepted the following bids: Richmond Granite Company, to furnish 150,000 granite paving blocks at \$51 per 1,000; A. M. Smith, to furnish 300,000 granite paving blocks at \$50 per 1,000; Booth Brothers and Hurricane Isle Granite Company, to furnish 200,000 granite paving blocks at \$49 per 1,000, and 150,000 paving blocks at \$51 per 1,000 respectively.

Work at the Hummelstown (Pa.) Brownstone quarries has commenced in earnest and the firm reports having more orders than it is able to fill. Many men could find employment there, as laborers are scarce. The new crusher being built by the M. & H. limestone quarry is nearly completed. It has a capacity of 200 tons of crushed stone per day.

Shanley's quarries at Byram, N. J., are being worked twelve hours daily, Sundays included, to get out the necessary amount of stone to fill contracts now on hand. They have also agreed to take all the products of the Berger quarries.

The Mountain Stone Company has a force of sixty men at work quarrying and dressing rock for the work on the streets of Salt Lake City, Utah. The Metropolitan Company has also increased its force lately.

About 250 Italians have been taken to the Drummond Island (Wis.) stone quarries.

The Reading Slate Company sold their quarry and machinery, near Mountain, Pa., to Joseph Lieberman, of Philadelphia, for \$350.

The Shaler & Hall quarry company, of Portland, Conn., has received a new boiler and engine to be used for hoisting purposes. The engine is built by J. S. Mundy & Co., of Newark, N. J., and is a

double cylinder, single drum, engine with 14x24 cylinders. It will lift thirty tons or in other words would raise an ordinary railroad car loaded with stones out of the quarry. The boiler is 100 horse power and stands fourteen feet high and is six feet in diameter. A new engine house will be erected at once. The company has also lately purchased a locomotive crane with a lifting capacity of ten tons. The machine is complete in itself, furnishing its own motive and hoisting power, and is constructed on the same principle as the cranes used by the wrecking trains of our railroads.

With the opening of spring, new discoveries of opals and onyx are being made in the Palouse (Wn.) country until these precious stones are becoming quite common. Several well defined ledges have been unearthed in different localities from those which created such excitement last season, and they bid fair to become a large source of revenue to that great agricultural region.

All three brownstone quarries at Washburn, Wis., have commenced operations, and expect to put out from 2,500 to 3,000 cars of stone this season, an increase of nearly 100 per cent over last year's business. At the Prentice quarry the great monolith is ready for raising from its bed if the necessary funds for its removal to Milwaukee are forthcoming. The designation of this stone as the "Ashland monolith" is an injustice which should be corrected. It is distinctively a Washburn production, separated from Ashland by at least 10 miles of Lake Superior water.

Senator Proctor, of Vermont, with two local capitalists, will soon break ground at Knoxville, Tenn., for the largest marble mill in the world. The plant will contain 50 gang saws.

The other day a blast that loosened one hundred tons of slate was made at the Washington Slate quarry near Slatington, Pa. About 1,400 feet of blackboards can be made out of the quantity of slate blasted.

The stone quarries in the vicinity of Bethlehem, Pa., are doing a thriving business at present.

The Norris & Christian Lime and Stone Company broke ground recently for their new crusher plant on the Campbell farm near Marion, O., having contracted with the Gates Iron Works of Chicago. This plant will, we understand, be equal to 500 tons daily capacity, and includes all the modern improvements in screening and separating devices.

S. Rist, an expert at granite work, who was sent from San Francisco to examine the Barret granite quarry near Washoe City, Nevada, reports having found ledges of granite that are far ahead of anything he had expected both in quantity and quality. He says there are thousands of tons above the surface that in every way excels the celebrated Quincy granite.

Allen Hall, 35 years old, a married man with a wife and one child, met his death last month in a horrible form, being literally buried alive under a mass of loose earth and slate in the quarry of Wm. Griffith, of Slatington, Pa. The cause of the terrible accident, it is alleged, was brought about by the carelessness of the man himself, who was working the steam drill, and turned the drill the wrong way, this mistake being immediately followed by the land slide, which resulted in his death and very serious injury to Simon Snyder, his companion.

MONUMENTAL NOTES.

The Blue Mountain Company, of South Ryegate, Vt., has shipped the large monument it has been cutting during the winter. It is the most expensive one ever shipped from that place. It goes to Long Island, N. Y. It is also getting out two large stones for the roof of a vault.

Waynesboro, Pa., is to have a soldiers' monument.

The Historical Society at New Haven, Conn., propose erecting a soldiers' monument.

Efforts are being made at Wooster, O., to increase the fund being raised for a memorial to Karl Merz.

The confederate survivors of De Kalb county, Georgia, propose to erect a monument to the memory of their dead.

George R. Smith, G. A. R., of Sedalia, Ill., has decided to erect a monument to D. R. Middleton, a late comrade.

The Ohio legislature has passed a bill appropriating \$90,000 for monuments to be placed on the battlefield of Chickamauga.

Augustus St. Gaudens, sculptor of New York, designer of the equestrian relief statue of Col. Robert Shaw for the city of Boston, has received the commission for the Bishop Phillips Brooks statue to be erected in Copely Square.

The Lane Monument Committee, with headquarters at Marshall, Tex., are raising funds for a monument to General Lane.

The G. A. R. post at Watseka, Ill., are contemplating erecting a \$2,500 soldiers' monument in the G. A. R. cemetery at that place.

As soon as the soldiers' plat in the Wyuka cemetery, Lincoln, Neb., has been arranged it is proposed to erect a monument there.

A fund is being raised to erect a monument over the grave of William R. King, at Selma, Ala. King was once vice president of the United States.

A public fountain to cost \$4,000 is to be erected at Rochester, N. H.

The New Hampshire House has passed a bill appropriating \$10,000 for statues of Gen. John Stark and Daniel Webster in National Statuary Hall.

The John J. O'Brien Association, New York City, has decided to erect a seven thousand dollar monument over the dead leader's grave in Calvary cemetery.

John U. Barr, a Pittsburg, Pa., architect, is making plans for a mausoleum to be erected by the Shields estate near Sewickly. The cost is estimated at \$25,000.

Governor Flower, of New York, has vetoed the bill appropriating \$20,000 for the purchase of Polopel's Island and erecting thereon a statue of Hendrick Hudson.

The Milwaukee Monument Association filed an amendment increasing capital stock to \$100,000.

The Maine and New Hampshire Granite Co., at North Jay, Me., is working a shaft for a monument that weighed in the rough about fourteen tons. The block of granite was lowered down over their cable road from the quarry on one car.

Chamberlin Post, of St. Johnsbury, Vt., has decided to erect a soldiers' monument this spring on the lot at the cemetery. A handsome statue is now being made. It is a six-foot figure representing a soldier at rest. It will stand on a six foot base. The statue will cost about \$400 and will be completed in season for Memorial Day.

The citizens of Boxboro, the smallest town in Middlesex county, Mass., are going to erect a monument to their first pastor, Joseph Willard, who was graduated from Harvard in 1766.

The Brooklyn, N. Y., Spiritual Association are proposing raising a fund for the purpose of erecting a monument to Mrs. Margaret Fox Kane, the first woman to hold intercourse with spirits.

L. O. Barker, of Concord, has arranged with the following New Hampshire concerns to participate in the furnishing of granite specimens for exhibit at the World's Fair: The Black Mountain Granite Co., Haverhill; Belknap Granite Co., Farmington; Great Falls Granite Co., Great Falls; Ola Anderson, Concord; J. R. Thompson, N. P. Matherson Young & Sons and Kittredge & Stevens of Milford.

A movement is on foot in Geary county, Kansas, headed by Captain James R. McClure to work up a sentiment in favor of having Congress erect a monument at Fort Riley in memory of General Nathaniel Lyon, one of the heroes of the war.

The soldiers' monument project at Stamford, Ct., has been referred back to the committee having the matter in charge with instructions to report at the annual meeting in October 1893.

The legislature of New Hampshire has voted an appropriation of \$1,200 for the purpose of erecting and dedicating a suitable monument to the memory of Gen. John Sullivan at Durham.

The Quincy Granite Manufacturers' Association have shipped the first installments of five carloads of monuments for exhibit at the World's Fair. The exhibit when complete will consist of some twenty-five memorials costing over \$10,000.

An international competition is announced for a monument to the memory of the great Hungarian statesman, Count Andrassy, which is to be erected in the city of Budapest. Three prizes will be awarded, the first of six thousand francs, the second of four thousand, and the third of three thousand. The competition will remain open until October 1, 1893. The monument must comprise an equestrian statue of Count Andrassy. Plans, and model, in plaster, are required, and must be delivered, before the expiration of the period fixed, to the president of the executive committee, II Foutcza No. 1, II etage, Budapest, Hungary.

The Ohio House of Representatives have passed Mr. Garber's resolution petitioning Congress to assist in the centennial celebration of Mad Anthony Wayne's victory, and to erect a suitable memorial structure in Greenville, O.

A contract has been closed between the Amador Marble Company, Amador, Cal., and Charles Camden for a vault to be erected at Mountain View cemetery to cost about \$6,000.

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WANTED—Contract to furnish blood-red marble or yellow marble, of a hard, tenacious quality; any common thickness or length. **THE JASPER MARBLE COMPANY**, room 75 Sheldon block, El Paso, Texas.

WANTED—A quarry superintendent who has had experience in brownstone quarrying, erecting saw mills, sawing stones, derricks, etc. I will be glad if parties desiring such position will correspond with me. **JOHN W. HINSDALE**, Raleigh, N. C.

WANTED—POSITION—A practical stone cutter with a thorough experience as general foreman of stone and brick masonry is open for engagement as general foreman or superintendent, or would take charge of a cut-stone business. Can furnish references. Address **A. Barr**, 129 Bell ave., Cleveland, Ohio.

WANTED—A steady, sober and competent granite and marble letterer, one who can take charge of shop can have desirable position at good wages by addressing **SANDS & WOLDRIDGE**, Elmyria, Ohio.

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WANTED—The irons for a 15-ton Derrick. Parties having articles to sell will please give lowest cash price and full particulars. **JOHN W. HINSDALE**, Raleigh, N. C.

WANTED—Traveling salesman to travel for a wholesale and retail granite house; also twenty-five granite cutters. Address **BRADDOCK GRANITE CO.**, 316 W. Markham St., Little Rock, Arkansas.

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The Excelsior Granite Company, of Montpelier, Vt., recently shipped a handsome monument to Milwaukee, Wis.

An ordinance providing for the erection of an equestrian statue to General Sherman in front of the City Hall at St. Louis, Mo., was passed by one branch of the city council, but failed of passing the other.

The people of Weymouth, Mass., have voted to appropriate \$1,000 for the purchase of a suitable piece of land on which to erect the monument to Miles Standish offered by Hon. Chas. Francis Adams for that town.

The *Holston Methodist*, published in Knoxville, Tenn., is receiving contributions to a fund for the erection of a suitable monument to the memory of the Rev. Dr. Wiley, who died a few weeks ago.

Frank Girard, Brooklyn, N. Y., has undertaken the task of raising a fund to place a monument at the unmarked grave of Billy Manning, at Piqua, O. Manning was the greatest of all burnt-cork artists.

A fund of \$1,000 has been raised at Dixon, Ill., for the purpose of erecting a monument at the grave of John Dixon, the founder of that place. The monument will be set up in Oakwood cemetery some time during the summer.

The trustees of Columbia College have contracted, with Edward Shaw of Great Barrington, Mass., for the erection of a mortuary chapel 20x24 feet in the cemetery at Sheffield to the memory of the late President Barnard, who was born there May 5, 1809, and died a few years ago. The chapel will be of selected field stone finished on the interior with pressed brick of various colors. It will be one story high, Gothic in design, costing about \$1,500. The contract calls for its completion early in August.

Gen. Taylor has been authorized to receive contributions for a monument to be erected to the late Prof. David Wilson, Ph. D., who was for a number of years principal of the Tuscarora and Airy View Academies, the same to be placed in Church Hill Cemetery near Port Royal, Va. Contributions to be in June 1.

A movement headed by Bishop Nichols has been started to erect a monument at Point Reyes, Cal., the place where it is supposed the first Anglican church service in the United States took place. This historical service was held June 24, 1579.

Ex-Governor Holt will himself erect a monument at the Guilford, N. C., battleground in honor of the North Carolina troops. It will mark the spot where the militia from Surry and Stokes counties stood their ground after the Continental line had retired.

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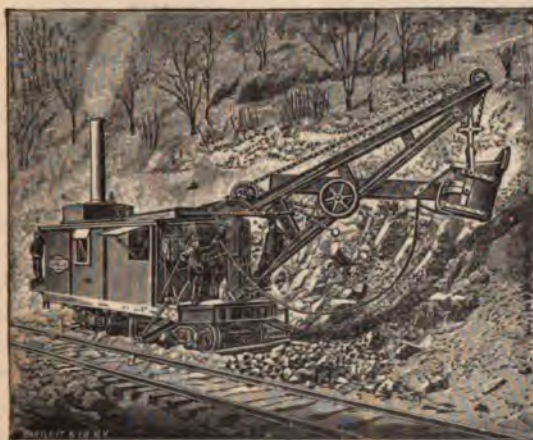
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ITALY'S RAILWAYS AND TELE- GRAPHS.

The railway system of Italy is owned chiefly by the government, and is operated by private companies under lease, for which they have paid to the government \$50,000,000, and have agreed to give in addition twenty-seven and one-half per cent. of the gross earnings. The passenger rates are as follows on express trains: First-class, four cents per mile; second-class, two and eight-tenths cents, and third-class, two cents. For accommodation trains the rates are rather lower. There were 8,161 miles of railway in operation in 1890, not including steam tramways, of which, in January, 1891, there were 1,574 miles. The number of persons employed was 99,685. The gross earnings of the companies in 1890 amounted to \$49,979,948, and the net earnings were \$16,706,953. The cost of the roads averages between \$43,400 and \$50,000 per mile.

The telegraph system of Italy is almost entirely owned and operated by the government, with the exception of the lines belonging to the railway companies, operated by them for their own purposes and in some cases for private business. The ordinary messages are sent at a fixed rate of twenty cents per fifteen words or less, including the address. Urgent telegrams have the precedence over all others, and are charged sixty cents for the same number of words. These rates are the same throughout the entire kingdom, no matter what the distance. The number of employees in 1890 was 7,511. The gross earnings of the system in 1890 amounted to \$3,010,974, and the expenses to \$2,703,137, leaving a net earning of \$307,837. The aggregate length of wires was,

in 1890, 83,270 miles. The number of telegraph offices operated by the railway companies in 1890 was 1,507. About the only criticism made in Italy upon the present telegraph system is that the tariff is considered rather high, which applies equally to the postal system; but the economic and financial conditions of the country are such that a reduction is not easy.—*Engineering News*.

THE FUTURE UNITED STATES.

"The population of the United States will increase for many years yet, but never again in so great a ratio as during the last century," said Professor W. Shaw. "This country can support a population of 300,000,000 much more easily than France can her 40,000,000, but after we touch the hundred million figure our increase will be slow. It is cheap homes and high wages that now attract immigration. Low-priced land will soon disappear, and with it will go high wages, despite the wisdom of statesmen. Then, instead of a constant stream of homeseekers pouring into America, a considerable stream will pour out towards the fertile lands of South America and Southern Africa. Uncle Sam will probably begin the twentieth century with 80,000,000 people; he will do it if he ends it with an increase of 20,000,000. By that time—the beginning of the twenty-first century—we will be a homogeneous people. There will be no longer Irish-Americans and German-Americans, but everybody will be American pure and simple. The many streams that are now flowing hitherward from all parts of Europe will have amalgamated, and the result will be one of the best balanced and most intellectual peoples the world has ever known."—*West Coast Trade*.

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I am much pleased with it. Hardly knew it in its new form. An excellent paper that all architects should have.—*Leon Beaver, Architect, Knoxville, Tenn.*

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Specimen copy STONE has been received, with thanks. You can send us the journal—we think it worthy of the subscription of any stone or marble dealer.—*Johnson & May, South Bend, Ind.*

IT SHALL BE.

We are well pleased with STONE and wish our subscription continued.—*James Baxter & Son, Minneapolis, Minn.*

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I consider it a splendid specimen of a magazine, especially when bound.—*Wm. J. Silver, Salt Lake City, Utah.*

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I was a former subscriber to your valuable journal but through neglect I let my subscription run out. I am glad you sent me a reminder, because I found your

journal most useful in my respect. Send me the same for one year.—*Frank Niernsee, Architect State House, Columbia, S. C.*

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Specimen copy of STONE received and we can bear testimony of its usefulness as a medium of information of vital importance to all persons engaged in the building or stone trades.—*Cam. Leach, Pres. Bass Island Brownstone Co., West Superior, Wis.*

BEST KNOWN TO HIM.

The illustrated STONE is here. Thanks. We inclose check to cover subscription for one year. Will say that book is the best known to me published in favor of building and monumental business.—*Stephen Maslen, Hartford, Conn.*

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Specimen STONE received. It is a fine number. Send it to me for a year. Am just opening a fine brownstone quarry at Montclair, N. J. Orders for 2,000 tons on hand.—*C. E. McDowell, B'oomfield, N. J.*

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TO CHECK A COLD.

A cold usually begins in the head and travels downward to the lungs. To prevent this is most important. Every one knows the symptoms of a cold. There is first the chilly feeling, or there may be a sense of heat pervading the entire body, accompanied by great languor. There is a feeling of pain across the bridge of the nose and a smarting, pricking sensation within the nose. There is a feeling of obstruction in the nasal passage. Sneezing is very frequent and soon there is a watery discharge. The sleep is disturbed and the appetite somewhat impaired. There may be violent headache and bleeding from the nose. When one finds himself with symptoms like these he should remain within doors and in his bed. Upon retiring to rest the action of the skin should be promoted by a hot foot bath to which a tablespoonful of mustard has been added. Place the feet in water as hot as can be borne keep the water at the same temperature by adding hot water to the bath from time to time. Throw a shawl or blanket over the knees and over the tub or bucket so as to keep in the steam and to thoroughly heat those parts not in the water. After fifteen minutes have passed rub the feet and legs dry, and immediately go to bed. It does no good, and does a great deal of harm to bathe and then walk about a room undressing. Either be dressed for bed before beginning the bath or undress after reaching the bed. When comfortably settled for rest and sleep, drink a glass of hot lemonade to which a teaspoonful of whisky, gin or Jamaica ginger may advantageously be added. A cup of hot tea, coffee or chocolate will answer quite as well as lemonade. The hot drink aids the bath in promoting a free perspiration. Care must be taken not to be exposed to drafts while wet

with perspiration. If it is necessary to leave one's bed the next day, it will be a greater protection for adults to take six grains of quinine with the hot drink at night.—*Boston Journal of Commerce.*

TOO BAD.

A rather curious experiment was made in Belgium the other day. A manufacturer, before paying his workmen, marked 700 five-franc pieces with a punch, and distributed the coins in equal number among his hands. At the same time he requested the keepers of the grog-shops adjacent to his works to hand over to him the five franc pieces marked in the way described. Two days after the wages were paid more than 300 of his silver coins were received by the employer. The statisticians have worked out the result, showing that in less than two days each workman had spent more than half his salary at the public house.

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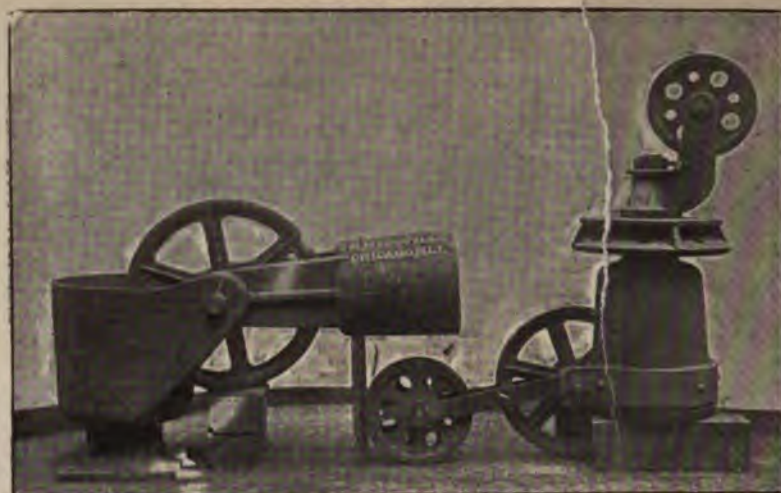
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TAKE CARE OF YOUR TOOLS.

Do you keep your tools in good order? If not, it will pay you to inaugurate a reform in your system of conducting the workshop, says a contemporary. The cost of shop tools is no mean item in the expense of running a business, and it is, therefore, as a matter of economy, important that proper attention be devoted to the care of every tool used. This attention should cover the handling of the tools and the storing of them when not in use. Many a tool has been ruined by an apprentice, or careless workman, through improper handling or putting away, by reason of not understanding the right way. Workmen are often met with who exhibit a reprehensible lack of knowledge concerning the treatment of shop tools, owing sometimes to the fact that instruction and example on this point are not always forthcoming from the foreman or boss. It is, of course, a well-understood truth that some workmen are deaf to all instruction of a beneficial nature. But this is an exception, not the rule. The inmates of a workshop, from the youngster just in his learning days to the older "boys," should find it necessary to observe the laws of right usage, order and cleanliness, when it comes to the handling of tools, quite as faithfully as they would any other useful law. The well-ordered workshop should have a place for "everything," and when not in use "everything" should be "in its place."—*Industrial American*.

HOW SCISSORS ARE MADE.

Though no complexities are involved in the making of scissors, or much skill required, yet the process of manufacture is very interesting. They are forged from good bar steel heated to redness, each blade being cut off with sufficient metal to form the shank, or that destined to become the cutting part, and bow, or

that which later on is fashioned into the holding portion. For the bow a small hole is punched, and this is afterward expanded to the required size by hammering it on a conical anvil, after which both shank and bow are filed into a more perfect shape and the hole bored in the middle for the rivet. The blades are next ground and the handles filed smooth and burnished with oil and emery, after which the pairs are fitted together and tested as to their easy working. They are not yet finished, however. They have to undergo hardening and tempering, and be again adjusted, after which they are finally put together again and polished for the third time. In comparing the edges of knives and scissors it will be noticed, of course, that the latter are not in any way so sharply ground as the former, and that, in cutting, scissors crush and bruise more than knives.

—*World's Progress*.

MONEY.

John Stuart Mill defines it as "a mere contrivance for facilitating exchanges;" a definition followed by another British writer, Jevons, in his book, "Money and the Mechanism of Exchange." Money is defined usually as a "measure of value;" it is something by the possession or surrender of which we measure the value to us of other articles. It need not be gold or silver. In Homer's time oxen were money; the Abyssinians used salt; the natives of the west coast of Africa used sea-shells; the early settlers in Virginia used tobacco; Marco Polo says that the Chinese used paper—not paper redeemable in coin, but paper made valuable by the Great Khan's orders. So really money is anything that is generally accepted as of value, which serves to do away with trading "in kind" or barter. It makes no difference what its nature is, so long as it is something which is of value to the people at large.

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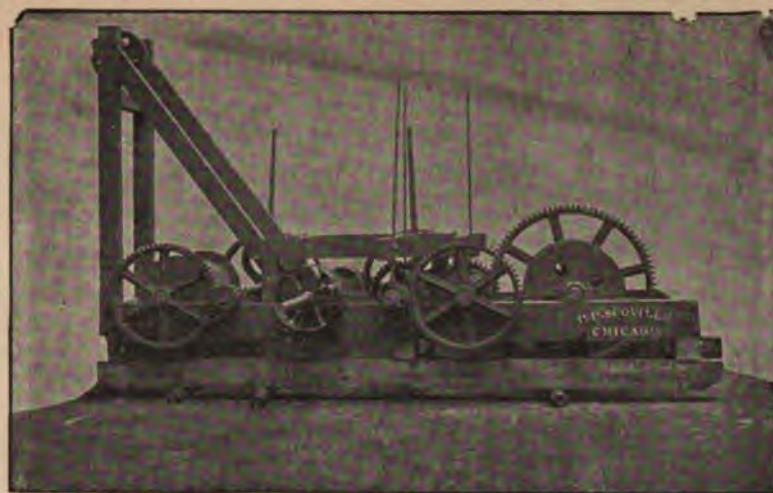
The truth of the proverb, that money is the root of all evil, is never brought home as plainly to one as when he considers how careful nature has been in hiding her precious metals. Even when the gold has been discovered, after the most laborious search, the weary finder often discovers that he is practically as far removed from his dream of wealth as ever.

To locate a gold mine and be unable to realize on it is the greatest hard luck that can befall the adventurous prospector. This happens in a multitude of ways, but most often it is caused by the absence of water. A representative of this paper recently had an interview with Mr. E. S. W. Drought, a mining expert of Kansas City. Mr. Drought, who has examined mines all through the South and West, gives it as his opinion that Arizona will be the great mining center of near future. From the tests he has made he has arrived at the conclusion that untold wealth lies waiting the man who can solve the problem of irrigation, for at the present time, with the utter lack of water, the gold lying buried there might just as well be at the bottom of the sea. So convinced is Mr. Drought by his researches that he has purchased considerable land and made many experiments in irrigation. He does not believe in shipping the quartz, for he has seen too many enthusiastic men who found they had all their labor for nothing when the heavy railroad freights were paid. Indeed, unless the ore is phenomenally rich, it does not pay to ship it, a fact which the experienced miner never seems able to grasp until he has had his fingers burnt. Instead of running this risk, Mr. Drought has devised an ingenious system of submerged dams, by means of which he can wash the sand. He would thus have nothing

to ship but the bullion. The cost of these dams he estimates at \$10,000, a very small sum, considering the great possibilities. As economy in excavating is the great secret of mining, this system may prove to be the proper one for use in Arizona, a state which so many believe to be naturally rich in precious metals, but which has been heretofore undeveloped on account of the great difficulty of irrigation.—*Mechanical News.*

NOT AN UNLIMITED SUPPLY.

"Monster lies are told in the East about the vast timber resources of the Pacific coast. These same lies have done duty two or three times before in the history of this country, once in Maine and once in Michigan, especially. While the timber growth of this coast is something marvelous, there is a limit to the supply available for the market, and that limit is a long way this side of popular reports. A prominent lumberman of Washington says: 'Firms that were boasting a few years ago that they had timber enough to keep them running a few hundred years are now hustling around to get something to saw. To hear them talk you would think there were any quantity of citizens out there carrying 50,000 to 500,000 acres of timber in their vest pockets for sale. I've yet to see the man or company that has 150,000 acres of timber. The man who has money to invest and whose debts are paid, can't do better than to get hold of Pacific coast timber and hold it. In a few years the coast is going to wake up and find it has thrown away its supply of lumber. I have seen ranches being cleared in the forests where they fell the trees, and the timber eight feet deep all over the tract. Then they set fire to it and keep the fires going till the whole thing is burned up.'"
—*Jacksonville, Oregon, Times.*



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C. E. Holley & Co., Agts., Johnston Bldg., Cincinnati, O.

THE ENGINE ROOM.

There is considerable difference in practice between engineers as to the proper speed at which governor balls should be run. The best American practice is to give the governor a speed somewhat in excess of the engine speed, often reaching an excess of 100 per cent. In England the usual way is to speed the governor slower than the engine and use heavier balls. The purpose of this is to make a little change in speed of the governor give considerable moving force by the difference in centrifugal force of the heavy weight at the different speeds. The American practice is to obtain it by a greater change in the speed of the governor than there is change in the speed of the engine. In this way the governor speeded to twice as many revolutions of the engine will show a change in its speed of two revolutions for every one of the engine. The majority of the engine builders here recommend as giving the best regulation, a governor speed of 100 per minute.

During my twenty years' experience with steam boilers, I have taken note of the following points, which may be of interest to your readers. A boiler should never be blown out while hot. Portable tubular boilers should stand at least twelve hours after the fire is out before letting out the water. Stationary boilers should stand long enough to allow the brick walls to cool. I usually let my boilers stand from 18 to 24 hours, and by so doing I keep the dirt in solution and can wash it out without any trouble. In case there is any scale I use a boiler pick and a good scraper. When there is any lime in the water, the latter should pass through a good purifier before being pumped into the boiler. Water should never be pumped into a boiler cold, as it makes hard firing and allows all the impurities in it to enter the boiler. In case the scale is hard, and cannot be easily removed, saturate it with coal oil before filling the boiler with water. This will loosen the scale without harm to the boiler. A good skimmer properly constructed and properly attended to will do much toward keeping a boiler clean, but cannot be relied upon. All boilers should be opened and thoroughly cleaned at least once in two weeks, as they are often burned by relying on some automatic device for keeping them clean that fails to do its work.—*N. A. L. Marchant, in Power.*

A paper on superheated steam was published in *Invention*, London, setting forth the details and results of a series of experiments, the last of which were completed in August, 1891. It concludes as follows: Taking the mean of the seven experiments made with the Uhler superheater, the increase in the boiler efficiency was 5.2 per cent., and the quantity of coal burnt per hour per unit of heating surface was diminished 11 per cent. with superheated steam. With this steam 20.7 per cent. less in quantity was produced per hour per unit of heating surface for same work done with the same number of boilers as under the ordinary conditions. By the use of superheated steam, therefore, one boiler in four can be dispensed with; the fuel was also better utilized, and the boilers kept in better condition, because a smaller quantity of coal was burnt and less steam evaporated per hour per unit of heating surface. It was found, and this is an important practical result of these interesting tests, that no surface damage or scoring is caused to the valves, pistons, or cylinders of the engines by the use of superheated steam, if metallic packings are employed for the stuffing boxes and the cylinders lubricated with oil of the best quality. The effect of steam jackets was diminished and was even found detrimental. In all the engines experimented upon steam was used in the jackets only to heat the cylinders before starting, and was shut off as the engines were running. These experiments also prove that the less difference between the temperature of the cylinder walls and of the entering steam the less condensation there will be during admission, and the smaller the gain by superheating. The tests do not throw much light on the question of steam pipe loss. In some trials the loss by radiation was about one degree F. per three and one-fourth feet, and in others much more; but it is absolutely necessary in all cases to protect the pipes with the utmost care, and the superheater should also be carefully covered to prevent radiation. The author concludes by stating, as his opinion, that the use of superheated steam, as exemplified in practice for the last year or two in Alsace, gives practically satisfactory results, and can be safely recommended. A considerable economy may always be realized, but the extent of saving will depend on the construction of the engines and the rate at which the boilers are worked.

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GEOGRAPHICAL DONT'S.

Don't say or write Austro-Hungary. The best writers prefer Austria-Hungary.

Don't, for mercy's sake, say "The Smithsonian Institute." The name is The Smithsonian Institution.

Don't forget that oriental names ending in "an" have the accent on the last syllable, as Teher-an, Beloochis-tan.

Don't call the Chinese "Mongolians." It is better to reserve the latter name for the people who live north of China proper.

Don't speak of a native of China as Chinaman. You would not say you had an Ireland man digging in your garden. It is better to call John a Chinese.

Don't call Bermuda "a North American Island," as a writer in a New York paper did. There are plenty of North American islands, but Bermuda is not one of them. It is an oceanic, not a continental island.

Don't, please don't, say New York is located on Manhattan island. Such a misuse of the verb "to locate" is trying to the nerves of the best lexicographers. Say New York is situated on Manhattan island.

Don't speak of China as our antipodes. Our antipodes is the point on the other side of the world reached by a straight line passing through the place on which we stand and the center of the earth. Our antipodes is in the ocean southwest of Australia.

Don't be mystified if on one map in your atlas Hudson bay seems to be larger than the gulf of Mexico, while on another sheet of the same atlas the gulf of Mexico appears larger than Hudson bay. The apparent discrepancy is doubtless due to the different map projections employed.

Don't say that the compass points to the true north, for it doesn't, except in certain places. The compass points to the magnetic north, which at present

is considerably west of the north pole. When Lieutenant Greeley was at Lady Franklin bay the declination of his needle was found to be very great, the needle pointing to the magnetic pole in a direction nearly southwest.

When you are writing a novel don't get your geographical facts badly mixed. In one of the popular novels of the day the writer introduced his hero in the antarctic regions in January, and speaks of the "inky blackness" of the nights he experienced there. The month of January is the height of the antarctic summer, and the entire month is one continuous day.—*Goldthwaite's Geographical Magazine.*

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Yours truly, THE CLEVELAND STONE CO.

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WALLS A CENTURY OLD.

The corner-stone of the white house was laid on Oct. 13, 1792; a little less than 300 years after the discovery of America by Columbus. The commissioners had, on the previous March 14, advertised for plans for a president's house and on July 16 they held a meeting in Georgetown and examined the plans that had been submitted. As is history now, they accepted the plan of James Hoban, a Dublin architect, who had made designs for the president's house, framed, it is said, on the model of the mansion of the Duke of Leinster at Dublin, the palace of royalty in Ireland. The stone was in part quarried at Aquia Creek, Md., and brought to a new wharf, built for the purpose, near the foot of Seventeenth street. No memorial of the ceremonial of laying the corner-stone has been discovered. It is certain that the Virgin Free Masons, who had in 1791 laid one corner-stone in the District of Columbia, and who in 1793 assisted in laying the corner-stone of the capitol, did not participate in laying the corner-stone of the white house. It was probably laid by Maryland Masons. The building began to rise, however, and in eight years was ready for occupancy. The donations of Maryland, \$72,000, and of Virginia, \$120,000, assisted to pay for it, and in April, 1800, four months after Washington's death, congress appropriated \$15,000 to pay for its furniture. Thenceforward it became the chief mansion in the nation. From the time when Mrs. John Adams hung the family wash in the east room to dry to now it has been a home set upon a hill to be seen

by all. It has had the fortune of the humblest homes in the land—marriage, births, and deaths. Its joys and sorrows have a wide echo, and now sympathy flows toward it from every portion of the land.

SPEED AND POWER.

Starting from the most general and obvious means of conveying power from motor to machine—the common leather belt—Sir R. Ball remarks that a light, fast-running cotton rope may be substituted for the heavy, slow-running belt, when the conditions are favorable to the exchange of speed for weight. Following up the line of reasoning thus presented, Sir R. Ball shows that a rope as light as sewing cotton, running at the speed of a rifle bullet, would carry a horse power. Proceeding to the extreme case of the lightest kind of line known (that of a spider's web) and the highest known velocity of travel (that of light), Sir R. Ball arrives at the astounding conclusion that if a line of spider's web could be driven at the speed of light, it would carry something like 250 horse power.—*The Age of Steel*,

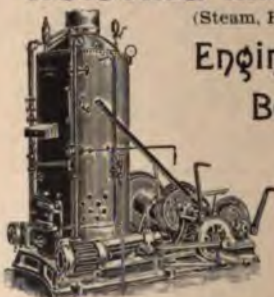
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FIRE PROOF BUILDINGS.

A Chicago building of the present style of steel frame construction has come safely through a severe fire test. The nine-story fireproof building of the Chicago Athletic Club caught fire Oct. 31, and the fire was very hot, owing to the quantities of barrels and lumber on the lower floors, while the upper rooms were in the hands of the carpenters and plumbers. The following is the published statement of an official of the insurance patrol: "As far as we can see, the building itself is all right. The big girders are not bent, the brick floors are not broken and nothing has gone up but the slight brick partitions and the brick casing around the pillars. A few unimportant scantlings that held the partitions in place are bent and must be replaced. On the whole, the building is as sound as ever." The following remarks are credited to Mr. Charles Clark, the superintendent, who has represented Mr. Cobb, the architect, during the construction of the building: "I never knew a building stand fire so well in my life. Of course the lumber and stuff inside burnt, and everything being unfinished there was nothing to prevent the fire rushing from the bottom to the top. As to the stone front falling to pieces, there is no stone which will stand fire and water combined."—*Engineering News*.

CONGRESSIONAL LIBRARY.

The Congressional library at Washington, now nearing completion, covers three acres of ground, will cost about \$6,000,000 and will hold 5,000,000 books. It is built of granite without, and iron, brick and marble within. The present library contains 650,000 volumes and 250,000 pamphlets. Congress annually appropriates only \$11,000 for the pur-

chase of foreign books, and Mr. Spofford hopes that this meager sum will be increased to an amount nearer in proportion to the \$60,000 per year at the disposal of the British Museum library for the same purpose. The plea of economical congressmen that there is no room for the new books will soon be without foundation in truth.

HIS MONOGRAM.



MRS. IKIE STRIN—"I vant a stone cut fer Ikie mit his monogram on it—nicht vahr?"

STONE-CUTTER—"All right."



The monogram as it appeared.—*Judge*.

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A NEW STONE AGE.

In the course of a lecture recently delivered before the Society of Arts, Dr. Temple Anderson said that in remote parts of Ireland, such as the Skaptadals, people still use bone and stone articles, which in more accessible districts have been supplanted by metal or earthenware. A photograph, which Dr. Anderson exhibited, showed a net with stone sinkers, a wheelbarrow with a stone wheel, a steelyard with a stone weight, and a hammer with a stone head. A quern or stone hand-mill was in use on the same farm, also horn stirrups, bone pins, rude bone dice and harness fastenings of bone instead of metal. On a neighboring farm was a basin formed of a cup joint of a basalt pillar. Evidently the stone age is not yet altogether a thing of the past; nor would it be easy to find anything more appropriate in such a primitive country than the meeting place of the district county council, which is in a spacious cavern in the lava. Mr. E. Magnusson, speaking on the lecture, said that in some places people descended from those who had long left the stone age behind, had found it necessary, because it was so difficult to procure iron, to create a stone age for themselves. They were creators of a new stone age, and not merely the followers of a tradition.—*Invention, London.*

COTTON IS STILL ROYAL.

The cotton crop of the United States provides the raw material for more than half the calico used by the entire human race. The population of the world is estimated at about 1,500,000,000. The cotton crop of 1889-90 was about 15,235,000 bales of 400 pounds each, or a total of 6,094,000,000 pounds, equal to about four pounds of raw material or twenty yards of calico per head, of which the southern cotton crop provided about

eleven and one-half yards. The crop of 1891-92 in the United States was 9,035,379 bales, or 4,309,875,783 pounds, or more than two-thirds of the entire production of the world. Of the total amount produced in the United States in 1891-92 5,933,437 bales were exported, and the balance used for domestic manufacture or stored for future use.—*American Contractor.*

THE WORLD'S CONSUMPTION OF COAL.

A statistician has attempted to determine approximately the world's consumption of coal. He estimates that in generating steam for engines aggregating 10,000,000 horse-power (some authors rate the world's engines as high as 20,000,000 horse-power) coal is burned to the amount of about 12,000 tons per hour. For gas for lighting the consumption is not less than 10,000 tons per hour, and for gas for heating and motive power, probably 4,500 tons. In metallurgy the use of coal reaches about 9,000 tons per hour, and in workshops and factories, 5,000 tons. It is difficult to calculate the quantity employed for domestic purposes, but 55,000 tons per hour, or 1,320,000 tons per day of twenty-four hours seems to be an under-estimate. Placing the actual daily consumption for the entire world as low as 1,600,000 tons, we find that a solid cube of coal more than one hundred yards on a side is burned up every day.

WHEN a workman in Germany is crippled in a machine the owner is obliged to foot his medical bills, and, if totally disabled, pay him a pension for life and his family one in case of death. Since the rigid enforcement of this law, accidents have decreased forty-five per cent. Every exposed mangler was covered, and careless workmen discharged.

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BURMESE ANTIQUITIES.

At a special meeting of the Anthropological Institute, held on October 18, Major R. C. Temple read a paper on "Developments in Buddhist Architecture and Symbolism," as illustrated by his recent exploration of caves in Burmah. The chief object of the paper was to draw attention to the extraordinarily rich and practically untouched field for the ethnographer and antiquary existing in Burmah. Among the numerous exhibits may be mentioned several gilt wooden representations of Buddha in his standing and recumbent postures, with his begging-bowl, and seated as King Jambupati, surrounded by priests and secular worshippers. Also a remarkable set of gilt wooden images from the platform of the great Shwedagon pagoda at Rangoon of nats, belus, hanuman myauks, and other spirits believed in by the Burmese, seated on the steps of a lofty tagondain, or post, on the top of which is always perched the figure of the Kennaya, or mythical bird, which apparently protects pagodas in some way. A very interesting votive tablet found in Pegu, and having on it a Sanskrit inscription, was shown. This tablet had been brought there by some pilgrims to Buddha Gaya, and deposited at a shrine in his native town. Similar tablets from Gaya may be seen in the British and Indian museums. Four views of the Kawgun cave showed the wonderful extent of its decoration by a vast number of terra-cotta tablets and images in wood, marble, alabaster, and other materials, and the extraordinary variety and multitude of the objects connected with Buddhistic worship, both ancient and modern, to be found in it. The Burmese have a great eye for scenery, and the situations of their chief towns and sacred buildings are nearly always beautiful and striking. They are also fond of building pagodas in difficult places, because the more difficult the

greater the merit. Nearly every unusually steep hill has, accordingly, a pagoda on its summit; and Major Temple concluded by showing the romantically-situated Kyaiktigo pagoda, near Shwegyin, perched on an isolated rounded boulder, which can only be scaled by ladders—and the exquisite hills surmounted by a beautiful little gilt pagoda—in the neighborhood of Dhammatha caves, on the Oyne river, about thirty miles from Moulmein.—*European Mail*.

ASBESTOS PORCELAIN.

M. Garros is the inventor of a new substance, somewhat resembling ordinary porcelain, but which possesses, as he claims, many advantages over that substance. The fibres of asbestos are exceedingly fine, their diameter varying between .00016 millimetres and .0002 millimetres, and consequently an exceedingly fine powder can be obtained from these. If it were possible to amalgamate these small particles without the addition of any foreign substance, it is evident, says the *Electrical World*, that a substance could be obtained which would be porous in nature, but the pores so fine that they could hardly be seen under the microscope. This substance is formed by pulverizing the asbestos, a process which is rather difficult if the ordinary mortar is used, but which is comparatively easy when the proper apparatus is employed. From this powder a paste is made by mixture with water, and this paste is kneaded, diluted with water, dried and kneaded again, and then molded into the proper form. By heating the objects in a crucible to a temperature of 1700° C., a porcelain is obtained with a translucency comparable to that of ordinary porcelain, and for this reason the inventor has given the name of asbestos porcelain to the substance. If it is heated for 18 hours at a temperature of 1200° C., then porous asbestos porcelain is ob-

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NATURAL GAS FOR CHICAGO.

Natural gas from the Indiana fields has been turned into 150 miles of Chicago mains, connecting with 20,000 service mains capable of supplying about 35,000 gas meters. Nearly every street on the south side between Fortieth street and the main branch of the Chicago river, and nearly every street in the north division between the river and North avenue will be supplied with the gas. The maximum capacity of the two pipes now completed from the gas fields will be 12,000,000 cubic feet every twenty-four hours. When it is remembered that the present total manufactured gas supply of the whole city does not exceed 20,000,000 cubic feet every twenty-four hours some idea can be formed of the addition to the fuel and illuminant supply of Chicago.

The initial pressure of the gas at the city limits is 600 pounds to the square inch, without pumping, although it will be let into the service mains under a pressure not to exceed two ounces, except by special arrangement. It is claimed that 16,000 feet of natural gas, which at 50 cents per 1000 cubic feet will cost eight dollars will develop as much heat and do as much work as one ton of anthracite coal. Its superiority comes in the handling and the cleanliness. Chicago now consumes 6,000,000 tons of coal annually.

THE PALMETTO.

The graceful palmetto, that grows so profusely in the lower tier of the Southern states, has recently become a factor in the industries of the South, for its wood is hard enough to carve, and its fibre is strong enough to make excellent cordage and a useful substitute for sponges. In Jacksonville a factory has been started for the purpose of making brushes and brooms of the fibre, and else-

where sink brushes are being made of blocks of the wood, half of whose thickness is converted into bristling points. The young leaves of the tree make a salad that the people are beginning to appreciate and the taste of it is likened to that of chestnuts. Bears knew about it long before the people did, and it is a favorite article of diet among them, the black bears climbing the trees and browsing on the fresh shoots as eagerly as they browse on watermelons.—*New York Sun.*

LABOR ORGANIZATIONS.

The numerical strength of the different labor organizations in the United States is shown by the figures given by the Federation of Labor in its hand book. There are 74 national trade unions, whose total membership is 675,147. The Carpenters' Brotherhood stands at the head with 65,000 members; the Amalgamated Iron and Steel Workers have 60,000 members; the Iron Molders' Union of North America, 41,000; International Bricklayers' and Stone Masons' Union, 35,000; Brotherhood of Locomotive Engineers, 30,000; International Typographical Union, 28,000; Cigar Makers' International Union, 27,000; Brotherhood of Locomotive Firemen, 23,000; United Mine Workers, 20,000; Granite Cutters' National Union, 20,000; Journeymen Bakers' Union, 17,000; Journeymen Tailors' Union, 17,000; and the Brotherhood of Railroad Trainmen and Brotherhood of Painters and Decorators, each 16,000.

FROM ACROSS THE WATER.

The illustrated *STONE*, of Indianapolis, is still further improving, the literary matter alone now occupying over a hundred pages, filled with matter calculated to suit all who are interested in the stone industry.—*The European Mail, London.*

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ANOTHER STEP IN ELECTRIC PROGRESS.

There is a possibility that an important change in the method of municipal transit will take place, and this is suggested more especially by the report that plans have been formed for running street stages in London by means of electric power. Storage batteries are to be used. No one who has kept track of the matter will deny that the perfection of the storage battery will make this possible, although other forces must aid to give the new departure the widest success. Among these things it will be necessary to have pavements which are approximately as smooth as the car tracks now used by traction lines. It is not probable that the system will come in all at once, but when it is provided on the principal streets, the independence of the storage battery vehicles and the ability to go wherever the traffic offers will present some very positive attractions. Among the chief advantages will be the saving of the investments in tracks. To be sure an equal or greater investment in pavements having at least the smoothness of asphalt will be necessary, but as this will be done by the cities for the benefit of all traffic on the streets it will effect a great saving to those who wish to engage in street traffic. Then, too, the ability of any person to run electric vehicles over any suitably paved street would abolish any monopoly in rapid transit.

But on the other hand the coming into use of such a system would necessarily cause a change to be made in regulations concerning the use of the streets. The speed at which vehicles not confined to tracks are to be run would be quite an important question. As it now is, people on the streets have a certain degree of notice that they must look out for the high speed taken by cars on the tracks and outside of the tracks they

are reasonably safe. When most of the streets are occupied by cable or electric lines this measure of protection may not be very great; but it is something. If electric vehicles independent of tracks were to be permitted to take an equal rate of speed, even that safety would be lost. The changed condition of things might be met by setting aside certain streets for high speed travel in given directions and restricting the rate of speed on all the other streets. It is interesting to speculate on the adoption of the system, and one good might be derived by its coming into use, and that is that it would do away with street car combinations and make watered stock a curiosity.—*Stoves and Hardware Reporter*.

A LONG TUNNEL.

A tunnel, the longest in the world, has been projected and begun, practically, under Simplon, to supercede the famous road over the mountain constructed by Napoleon. The "Route of the Simlon" is thirty-eight miles in length; the tunnel will be a trifle less than twelve miles and a half. The wagon road is 6,592 feet above sea level, is twenty-five to thirty feet wide, crosses 611 bridges, and passes through several tunnels. It takes eight or nine hours to cross the mountain by the wagon road; the tunnel can be traversed in three-quarters of an hour. The power to run the drills, light the workings, and ventilate the tunnel is to be derived from the river Marsa. The cost is estimated at about \$1,240,000 a mile.

PROGRESSIVE AND VALUABLE.

One of the most progressive and valuable magazines published in this country is *STONE*, devoted to building interests. It is fully abreast with building progress and contains many interesting general features.—*The South*.

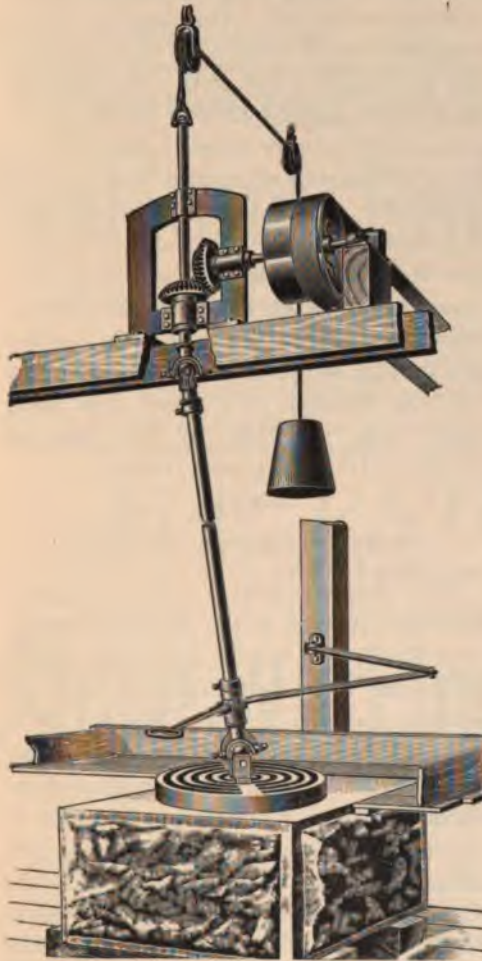
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IRON CASKS.

According to experiments which have been conducted by Herr Arthur Holle of Munich, with a view to manufacturing iron casks suitable for transport purposes, it is demonstrated that simple coating of the interior of the barrel with various kinds of lacquer, enameling, and also tinning, zincing, nickeling and coppering, are unsuitable. In the end the German technologist found that lacquered sheet iron was best adapted to the object in view; but he endeavored, at the same time, to secure a fitting insulating coating by means of an intermediate layer. Strong paper, it was shown, became decomposed; the use of thin gauze material was also pronounced to be impracticable. The best intervening agent proved to be silk paper. The operation of applying the coating was as follows: The interior of the barrel was first lacquered; the tissue paper was then evenly put in position with the aid of some varnish; and finally it was furnished with a finishing coat of lacquer. The covering thus obtained resisted the influence of heat, moisture and of acids, which were much stronger than those contained and developed in beer. It is to be noted that a special kind of lacquer is used, so that the fluid may not savor of the varnish. With regard to the shape of the casks, Herr Holle is of the opinion that a cylinder, set-in top and bottom, offers the most suitable form of barrel. Simple soldering of the heads does not seem to suffice, and they should, therefore, be secured with four or five copper rivets. Casks fastened in this manner are claimed to sustain without difficulty a pressure of five atmospheres. Closing of the barrel is effected by means of a metallic flange-nut and brass screw. For tapping the liquid in the iron cask, a faucet of peculiar construction, furnished with a pipe for the inblowing of air, is utilized — *Manufacturers' Gazette*.

TACOMA A SUPPLY POINT.

An indication of the extent and importance of Tacoma as a shipping center and supply point, is found in the growth of its manufacturing institutions and the manner in which the product of mill and factory is finding its way into new and distant markets. With few exceptions the foreign business of our saw mills, shingle mills and sash and door manufacturing has almost doubled within the year, while the flouring mills also show a very large increase. An evidence of the fame of the articles here manufactured and the distance to which they are being sent, may be found in the fact that Wheeler, Osgood & Co. have just completed a large shipment of doors to Ottawa, Canada, while the Puget Sound Flouring Mills, with a capacity of 800 barrels daily, have been running day and night, Sundays included, since September 1, and are still unable to fill orders. A large amount of the product of this mill goes to supply the Oriental trade. — *West Coast Trade*.

FACTS ABOUT KOREA.

Korea is a consolidated, homogeneous nation, speaking the same language, having the same religion, divided into no clans hostile to each other, occupying a country favored as to climate and exceedingly rich and productive in agricultural and food products, with 100,000 square miles of territory and 16,000,000 of people. Korea has a population eight times more than Denmark or Greece; five times more than Switzerland; over three times that of Portugal; and nearly three times that of Belgium. In the American Hemisphere there is no nation except the United States which exceeds her in population; of the others, the only two approaching are Brazil, the largest and most populous nation in South America, which has 12,333,000 inhabitants, and Mexico, having 10,400,000.

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1—Stone.

THE FUTURE OF WINNIPEG AND MANITOBA.

As a natural result of the continued ingress of settlers into Manitoba, no less than 36,000 having settled in that province during the past year, quite an impetus has been imparted to the value of real estate in Winnipeg, which has doubled within the past twelve months, while immense quantities of land have been sold by the C. P. R., Hudson Bay Company and the government at an advance of two to three hundred per cent. And if it be true that a dam is about to be constructed on the Assiniboine river at Winnipeg, and connection made between Lake Manitoba and the Assiniboine river, a water power will be concentrated at Winnipeg, equal to that of any other place on this continent, which will place it in a position to produce the bulk of the manufactures used by the people of Manitoba. If, as expected, these improvements are carried out, Winnipeg within the next ten years will be a second Minneapolis with a population of 150,000 to 200,000 inhabitants. There can be no doubt that within the above specified time Manitoba will be producing nearly 100,000,000 bushels of wheat per year, if not more. There is undoubtedly a great future for Winnipeg as the capital of Manitoba, as well as for the province at large.—*Trade Bulletin*.

METAL AND WOODEN TIES.

Metal ties in Belgium do not appear to have met with unqualified success. The Belgian state railways have for five years been testing the relative values of metal and wooden ties. Official reports of the tests state that it was very difficult to keep the track laid with metal ties in good shape, particularly as the stone ballast under them was gradually pulverized. The ties themselves were much damaged after five years wear, by cracks

starting from the bolt holes. Up to the time of making the reports from which these facts were taken, the track laid with metal ties had cost for maintenance about nineteen times as much as the track laid with creosoted oak ties, and many of the metal ties were so badly damaged that they would soon have to be removed. In Austria, however, it seems probable that the metal ties will in due time be used on an extensive scale. The state railway administration, it is reported, has contracted with the syndicated Austrian rail mills, for a large supply of metal sleepers, at a price but slightly inferior to that paid for steel rails, with the proviso, however, that a lower rate is to be accepted should the demand exceed 25,000 tons. It also stated that the Southern railway is inviting tenders for the supply of 35,000 iron ties.—*Engineer, London*.

MULE VS. LION.

Most of us laugh at the homely mule and admire the lordly lion, although one good mule is worth a thousand thieving lions. Most of us have laughed at the mule which attempted to look like a lion and was whipped by his master for the nonsense. There is something wrong in the public sentiment which caused that useful mule to aspire to be a worthless lion. There is too much disposition among the people to admire the worthless ideal, and make light of the useful reality.—*Atchison Globe*.

FIRST COINS.

The first coining of money is attributed to Pheidon, King of Argos, in 895 B. C. Coined money was first used in this country twenty-five years before the Christian era, but gold was not coined here until the eleventh century, and money was not given the round form to which we are accustomed until the lapse of another hundred years or so.

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A CHANGE IN TELEGRAPHIC COUNTS.

There seems to have been some cause which has necessitated a change in the counting of words in telegrams, for Gen. Thomas T. Eckert, acting president of the Western Union Telegraph Company, has issued an order regulating the counting of words and numerals in telegrams. Under the new rules dictionary words, initial letters, surnames of persons, names of cities, or the abbreviations thereof, will be counted, and charged for each as one word. When names of countries or counties occur, all of the words will be counted, for example, "Queen Anne County," will be taken as three words. Figures, letters, commas, points and bars of division, or any combination thereof, will be counted, each group being taken separately, three figures, letters or signs to the word; and any group of less than three figures, letters or signs will also be counted as one word, viz.: "52 C 731," two words; "53,000,000," three words; "per cent," two words, except in cases of "a. m.," "p. m.," "f. o. b.," "c. o. d.," etc. The cost of cipher messages will be increased by this system, but the tolls upon ordinary messages will be decreased. General Eckert has also issued a circular authorizing all managers to send "Collect," without a guarantee, any telegrams offered by traveling agents or representatives addressed to their home firms, upon the presentation of proper credentials.—*Ohio Valley Manufacturer.*

LUMINOUS PAINT.

For making luminous paint the following has been given: Take oyster shells and clean them with warm water; put them into the fire for half an hour; at the end of that time take them out and let them cool. When quite cool pound them fine and take away any gray parts, as they are of no use. Put the powder into a crucible in alternate layers with

flowers of sulphur. Put on the cover, and cement with sand made into a stiff paste with beer. When dry, put over the fire and bake for an hour. Wait until quite cold before opening the lid. The product ought to be white. You must separate all gray parts, as they are not luminous. Mix into a thin paint with gum water, as two thin applications are better than one thick one. This will give a paint that will remain luminous far into the night, provided it is exposed to the light during the day.—*Boston Journal of Commerce.*

BERMUDA PRODUCTS.

The regular season for shipment of onions and potatoes from Bermuda to New York is from the middle of May to the middle of June: 30,000 crates of onions and 3,000 barrels of potatoes make an average weekly cargo for the steamers engaged in that trade in the best of the season. All the beets, onions, potatoes and tomatoes are raised on less than 2,000 acres of land. There are only 10,000 acres in the whole Bermuda Islands, and of these nearly 8,000 acres are hills or woodlands, unsuitable for cultivation. Four acres of tillable land is a big farm in Bermuda, and the man who owns such an immense tract is a capitalist. The usual size of a "farm," is from a quarter of an acre to two acres that can be cultivated, to which is attached as much hill, rock and timber as one chooses. It is in part the falling off in the prices of early vegetables that has induced so many Bermuda planters to turn their onion beds into lily fields. The business of raising Easter lilies for the American market has been boomed for about ten years in Bermuda. It has already reached such proportions that the profit is gone, and many growers fail to get as good returns as they would in the use of the same land for vegetables.—*American Cultivator.*

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POWER OF FLOWING STREAMS.

Common opinion respecting the energy or power of flowing streams is nearly always exaggerated, and greatly so. A current of large area conveys an idea of an almost irresistible force, when in fact it represents but a trifling power. The following table, taken from the *Mechanical World*, will serve to show how

Velocity of Stream.		Equivalent Head.		Pressure.	Total Energy
<i>Miles per Hour.</i>	<i>Feet per Second.</i>	<i>Feet.</i>	<i>Inches.</i>	<i>Pounds per Square Inch.</i>	<i>H. P. per Square Ft. Sec. Area.</i>
1	1.467	0.033	0.43	2.1	0.0055
2	2.933	0.134	1.62	8.4	0.0445
3	4.4	0.300	3.60	18.9	0.15
4	5.867	0.534	6.42	33.6	0.355
5	7.333	0.834	10.07	52.5	0.694
6	8.8	1.200	14.39	75.6	1.2

little work is represented by the current of streams. The force that may be utilized, or the head seen in the third and fourth columns, is very slight, and is the height to which the water will rise when obstructed. This depends, in a measure, on the shape of the obstructing faces. A plain radial current wheel will give not more than two-thirds the work that a well made Poncelet wheel will, because the water will rise higher on the curved floats of the latter named wheel. Current wheels are usually a disappointment, because falling short of their expected duty, and a habit they have of going off in floods.

MANAGEMENT OF BELTS.

We watched an engine tender the other day at work on a belt, which showed above all things that he didn't understand the why and wherefore of belts and belting. Someone at one time or other had put in a short piece of rubber belting to lengthen out with, and while the leather part was all right the

rubber part gave out and broke at the lace holes. What did he do? What he had done before, cut off the ragged edge and laced it up once more, never thinking that each time the belt was shortened the tension upon it when laced increased. Every time he put the belt on it broke in a minute, until we suggested a new piece of leather in place of the rubber, and proposed a piece longer than the rubber was originally. "That wouldn't do; it would be too loose." But it did do, and when the load is on, that belt is as slack as it should be on the slack side. This reminds us of another case where we ran across a man lacing a belt and after every effort it broke. It looked like a hopeless task to get it to hold, when at last it went off all right. We had concluded there would be another break, so had some curiosity to see why it did not this time. It appeared that the engineer had failed to secure the lacing when he finished, so the lacing pulled out several holes before it caught and thus lengthened the remainder to fit, practically lengthening out the belt three or four inches. The tension was enough to drive the load, but not enough to break the belt. It does not do to have a belt too tight. It ruins the belt and there is a big friction loss also.—*Machinery, London.*

THE WORLD'S GOLD.

Respecting the gold production of the world for the last five years, the following figures are made public: In 1887, 5,097,600 ounces; in 1888, 5,251,000 ounces; in 1889, 5,641,000; in 1890, 5,586,000 ounces; in 1891, 6,033,000 ounces. The set-back in 1890 is noteworthy, as being the first for many years. The production in 1891 is the greatest on record; and, presumably, the recent development of the Witwatersrand gold fields has much to do with the fact.



PATENT LAW.

V. H. LOCKWOOD,

(Successor to Charles P. Jacobs.)

ATTORNEY AND COUNSELOR,

SPECIALTY:

Patent and Trade-Mark Law,

Counsel in Patent Cases,

Patents Procured in any Country,

On reasonable terms. Expert draughtsmen and mechanical engineer in office.

60 EAST MARKET-ST., INDIANAPOLIS, IND.

CUT OUT AND RETURN WITH YOUR ORDER.


D. H. RANCK PUB. CO., Indianapolis, Ind.


GENTLEMEN: Please send "STONE" for the period of _____
months, beginning with _____ number, for which _____
close \$ _____

Name _____

Postoffice _____

State _____

 One Year, \$2; Six Months, \$1.25; Single Copies, 25 cents.

 Remit by postal or express money order, or by bank draft on New York, Chicago, Cincinnati or St. Louis
Country checks must include 25 cents for exchange.

CALIFORNIA NUGGETS AND POCKETS.

The days of rich pockets and nuggets are by no means over in California. For instance, a few weeks ago they got \$10,000 out of a pocket in the Snow mine, Forbestown, Butte county, and the mine since made a cleanup of \$20,000. Henry Miller of Magalia, in the same county, found a little pocket in his claim from which he took out in a few minutes \$580. Ed. Gilbert found in his drift mine near Butcher ranch, Placer county, a nugget worth \$2,300. It was about ten inches the long way, from three to seven inches in width and from an inch to an inch and a half in thickness. The whole surface was very irregular. Its beauty consisted of having the formation of crystallized quartz, with clearcut corners, the sides of whose cubes shone with dazzling brilliancy at any angle from which a person viewed it. The mine has been worked more or less since 1856. Louis Page and partners at Bald mountain, Tuolumne county, after working a tunnel for 19 months, have struck several very rich pockets where they have found nuggets worth \$40, \$80 and \$140, and a lot more in sight. These are only a few instances seen in our exchanges in the past two weeks or so, and there are doubtless others not chronicled. There are thousands of Chinese working in the mines of the state, but no one knows what they get; and in the richer claims run by white men little is said as to the product. The gold mining interests of California are becoming better organized than they have been of late years. The northern counties are only partly prospected and even in the older mining regions there is room for discovery. There are many mines being worked steadily by private parties which are paying handsomely, but as no stock is for sale, very little is said of them in the public prints.

A MEXICAN TUNNEL.

The city of Mexico, lies in a saucer-like depression surrounded by mountains and hills. This location once was the site of a lake, and the city was on an island in its center. The basin is about sixty-five miles by twenty-five. There is being built through one of the hills an immense tunnel about a mile in length, through solid rock. Its purpose will be twofold—it will be used to carry the sewage and waste water of the city and will be a relief against floods. Back of the city, and not many miles distant, are two lakes, one higher up among the hills than the other. When the highest one gets full and overflows the water runs into the one below. When the other lake overflows it floods the city. A canal is being built from the lower lake so that at a certain stage of water the overflow will run through this tunnel now being built, thus relieving the city from all danger. It is a big undertaking.

THE ROSETTA STONE.

The "Rosetta Stone," a famous Egyptian curiosity now in the British Museum, was discovered in the year 1799, by M. Boussard, a French explorer, near Rosetta, a seaport of lower Egypt. It is of black basalt, about forty inches long by thirty wide, with three engraved inscriptions upon its surface. The first of these is in Greek, the second is a conglomeration of hieroglyphics and the third in enchorical writing, a system used by the Egyptians in recording everyday matters. After years of laborious research the savants of Europe ascertained that the three inscriptions were three versions of a decree in honor of Ptolemy Epiphones by the priests of Egypt because he had remitted their taxes. This wonderful relic dates back to about the year 200 B. C.

DAVID REED,

Quarry, Owner and Wholesale Dealer in

Buff and Blue
BEDFORD STONE,

ROOM 909 CHAMBER OF COMMERCE,

CHICAGO, ILL.

Quarries and Mill, Bedford, Ind.

I HAVE IT.

A Rubber Spring for the Wardwell Channeler

That beats them all. Have captured the trade of this vicinity, and am getting any number of orders from a distance. MAY I HAVE YOURS? Springs sent on three months' guarantee.

JOHN W. PHILPOTT,

198 Seneca st ,

Cleveland, O.

VERNON BROWNSTONE COMPANY.

—Producers of—

Red and Buff Sandstone,

Quarries, Glenrock, Wyoming.

General Office, 96 Washington Street, CHICAGO, ILL.

Nine lintels of Vernon Redstone were placed in American National Bank Building, Omaha, Nebr., 16 feet 10 inches long, 1 foot 6 inches wide, and 1 foot 8 inches wide. These lintels support the weight — above. Crushing resistance of 10,000 pounds to the cubic inch.

BRANCH OFFICE, 436 CHAMBER OF COMMERCE, OMAHA, NEBR.

F. R. PATCH & CO.,

ENGINEERS AND MACHINISTS.

—Manufacturers of—

Stone-Working Machinery

Of Every Description.



PROPRIETORS

Mansfield Foundry and Machine Works.



Derrick Castings, Steam Hoisters, and Hoisters of all Kinds. Slate Saws and Planers.

RUBBING-BEDS OF ALL SIZES A SPECIALTY. A COMPLETE LINE OF ENGINEERS' SUPPLIES.

RUTLAND,

-

VERMONT.

HOW TO RECKON LONGITUDE.

People are often curious, if not otherwise interested, to know how to reckon their longitude. To do this in a simple way they must have a starting point, and like mariners, be prepared with Greenwich or Washington exact time, depending on what point they desire to reckon from. The time must be kept by an unfailing watch or other time-keeper. The difference in the time to be reckoned from and local time, or the time to be reckoned to, must be multiplied by fifteen, and the result will be the longitude required expressed in degrees, minutes and seconds. As for instance, suppose the difference in the two times be one hour twenty-two minutes and ten seconds, the difference in longitude, as per the rule given, would be twenty degrees, thirty-two minutes and thirty seconds.

It is quite easy for those prepared to do so, to keep Washington time, as local time is correctly maintained there; but it is not so convenient to obtain correct local time at minor interior points. It can, however, be obtained in clear weather by the use of a well constructed sun dial. Get the time by the dial, and then examine the "sun fast" and "sun slow" columns of the almanac. If the sun be fast, set the watch as many minutes behind the dial time as the almanac says the sun is fast. If the sun is slow, set the watch or clock ahead of dial time accordingly. Like many other such problems, it looks mysterious until understood, when it appears quite simple.

PREVENTING RUST.

A good plan of preventing tools from rusting is the simple preparation employed by Professor Olmstead, of Yale College, for the preservation of scientific apparatus, and which he long ago published for the general good, declining to have it patented. It is made by the slow

melting together of six or eight parts of lard to one of resin, stirring till cool. This remains semi-fluid, ready for use, the resin preventing rancidity and supplying an air-tight film. Rubbed on a bright surface ever so thinly it protects and preserves the polish effectually, and it can be wiped off nearly clean, if ever desired, as from a knife blade; or it may be thinned with coal oil or benzine.

PITHY PROVERBS FOR ADVERTISERS.

The following proverbs for advertisers were originally written by "Wal," and first appeared in London *Fame*. They are so much to the point that they have been reproduced without further comment:

Spare the advertisements and spoil the business.

He is a wise man who takes a large space and puts little matter in it.

Whoso loveth a good business loveth advertising, but he that despiseth fame is an ass.

A good advertisement is like the merchant's ship; it bringeth abundance from afar.

He that payeth for advertisements with goods is a fool, for he raiseth up competition in his own market.

Every wise man advertiseth, but a fool speculateth on the stock exchange.

He that trusteth in a large circulation shall be wealthy, but he that believeth in cheap rates shall be busted.

The smallest circulation hath oft the loudest tongue.

A big advertiser leaveth an inheritance to his children's children's children.

A small advertisement is better than a bad traveler.

There is no worse robber than a journal that does not circulate.

It is hard to get a 40-page catalogue into an inch in column.

An advertisement is not a luxury, but a necessity.

IF YOU ARE AN ARCHITECT....

You can have any one of the following articles free of charge by sending us a cash subscription to "Stone." Your business card must accompany the order, as we limit this offer to architects actively engaged in business.



An Architect's Triangular Scale, 12 inches long, graduated 3-16, 3-32, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, 1, $1\frac{1}{2}$, and 3 inches to the foot, and one edge 16 to the inch. Or an Engineer's Triangular Scale, 12 inches long, graduated 10, 20, 30, 40, 50, and 60 parts to the inch.



Two flat boxwood scales, each 12 inches long, graduated, the one, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, and 1 inch to the foot; the other, $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, and 3 inches to the foot.



An Alteneder Ruling Pen, 5 inches long, spring on upper blade, aluminum handle with pricker point.



An Alteneder Swivel Curve Pen, spring on upper blade of pen, hollow metal handle.

The above goods are manufactured by Theo. Alteneder & Sons, Philadelphia, and are warranted the same as if purchased direct of them. Address,

D. H. RANCK PUBLISHING CO.,
Indianapolis, Ind.

A TRADE PROMOTER

The transitory commercial arrangement between the United States and the republic of Salvador, which went into effect December 30, 1891, has been superseded by a definitive arrangement, the signatures to which were exchanged the 23rd of November at Managua, by the minister of foreign affairs, under the authority of the congress of Salvador, and the representative of the United States. It is believed at the department of state at Washington, that the definitive arrangement will tend greatly to promote trade between the two countries, and will open a profitable market to numerous products and manufactures of the United States, which have hitherto been hampered by various restrictions. —*Engineering News.*

IMPORTANCE OF OBEYING INSTRUCTIONS.

Several years ago the Rothschilds held a large quantity of cotton in New Orleans which they instructed their agents in that city to sell when cotton should reach a certain price. The agent, believing that the price of cotton would go beyond the figure named by his employers, held on till he was able to sell it at a price which netted \$40,000 more than he would have got for it if he had obeyed his orders from London. He joyfully informed his employers of his success, supposing they would share his satisfaction at the result. Imagine his surprise and chagrin when he received a reply saying in substance: "The \$40,000 you made by disobeying your instruction is not ours. It is yours. Take it. Mr. X., your successor, starts for New Orleans to-day." At first thought, this might seem like a strange proceeding, and that very few employers would object to receiving all they could get. But there is a principle involved which jus-

tifies the action of the company. Supposing, instead of making the \$40,000 by disobeying instructions, that amount had been lost. That was probably the view taken. It was not because of the gain or loss in this particular instance, but because of the loss of dependence in their employe, and the possibility of results from a future disobedience of instructions. It is always well to follow instructions, for, in that case, no blame for consequences is possible. The printer's rule, to "follow the copy if it goes out of the window," is a pretty good rule to adopt in any business, and, if the agent follows instructions, he is safe in the event of any trouble which may be the result. —*Industrial World.*

DECREASED CORN ACREAGE.

The official returns show that the decline in the acreage of the United Kingdom devoted to corn growing still continues, for we cannot accept the slight increase in the area sown with oats and rye as any symptom that the downward progress of British agriculture has been permanently arrested. Technically speaking, rye, beans, and peas come under the head of corn, as distinguished from green crops. But we must look to the production of wheat and barley for any sure test of the farmers' position, and the result of the inquiry is, we regret to say, far from satisfactory. Comparing the present with last year, we find the number of acres under wheat less by fully 90,000 than in 1891, while the area under barley has fallen off by nearly 80,000 acres. It is remarkable, however, that in Scotland the proportion is the other way, and thus in most of the Scotch counties there has been a slight increase in the area under wheat since last year. But it is not nearly enough to compensate for the reduction on this side of the border. —*European Mail.*

WASHBURN & MOEN MANUFACTURING CO.,

WORCESTER, MASS.

NEW YORK CITY.

CHICAGO.

Makers of Iron and Steel Wire for all Purposes.

Manufacturers of Wire Rope and Cable

ESTABLISHED,

1831.



ESTABLISHED,

1831.

IRON, STEEL AND GALVANIZED, FOR HOISTING AND GUYS.


Fittings of All Kinds Attached to Ropes when Desired. Prompt Shipments from Stock.

Chicago Office
and Warehouse.

107 & 109 LAKE STREET.

SOME QUARRYMEN USE POWDER

AND FIND IT PAYS.

 **T**H**E**R**E**S would use it, but are afraid it will damage the Rock. It won't, if you know how. Hundreds have learned that it is the Safest, Speediest, Most Economical Way to Quarry

DIMENSION

∴ **STONE** ∴



Write to

*Knox
Can
Show
You
How.*

THE KNOX ROCK BLASTING COMPANY,
PITTSBURGH, PA.



HERCULES

POWDER

STRONGEST AND SAFEST DYNAMITE EXPLOSIVE
KNOWN TO THE ARTS for all Mining, Railroad
Work, Rock and Stump Blasting.

FUSE, CAPS, BATTERIES AND ELECTRIC MINING GOODS.
Hercules Powder Co., 40 Prospect St., Cleveland, O.
J. W. WILLARD, Gen'l Manager.

Indianapolis Office, 81 West Washington Street.

TWO CANAL PROJECTS.

Projects for two canals or systems of navigation for east and west transportation have lately been brought before the country with some prominence. The first project is to connect the Lake of the Woods, and the lakes and water-courses between it and Lake Superior with Red Lake and through the Red Lake river, with the Red River of the North. It is probably quite within the range of practicable engineering to connect the 1,400 miles of steamboat navigation on the Saskatchewan with this proposed improvement, though whether it would be a cheaper route to build than that from Red Lake through Lake Pokagema, the upper Mississippi and the St. Louis River to Duluth may be doubted. Such a canal, if built, would in a short time develop a traffic which would call for another lock at the "Soo."

News of the other project comes through the *Official Gazette*, published at Ottawa, and sets forth that an international syndicate will apply to the Dominion authorities for a charter for the International Navigation Company which will endeavor to connect Lake Erie, with locks twenty-two feet draught, fifty feet wide and 450 feet long. The length of canal to connect Lake Erie and Ontario will be about twenty-four miles. The fall of 326 feet is to be overcome with four locks, and the canal passed in four hours. From the foot of Lake Ontario the canal is to be held up past Galop's Canal, Rapide Plate Canal, Farran's Point Canal and the Cornwall Canal to Lake St. Francis, which is to be entered by a lock of eighty-four feet lift. This is doubtless good engineering, as it must save a large part of the dredging in the St. Lawrence River, the expense of which has always been held to be prohibitory when a twenty-foot navigation of the St. Lawrence has been proposed. From Lake St. Francis

one branch will descend by a lock of eighty-two feet lift into Lake St. Louis and by another lock of forty-five feet lift into Montreal harbor. The other branch will descend into Lake Champlain by a lock of about fifty feet lift, and passing up that lake cut through the divide into the Hudson River, descending to tide water at Troy by one lock of about thirty-five feet lift.

Between Lake Erie and Montreal there will be seven locks and 363 miles of navigation, of which forty-five miles will be canal. Between Lake Erie and New York there will be seven locks and 706 miles of navigation, of which 141 will be canal. Between Montreal and New York will be four locks and 403 miles of navigation, of which 115 will be canal. The time from Lake Erie to Montreal will be thirty-two hours; from Lake Erie to New York, sixty hours. Between Montreal and New York the time will be thirty-eight hours.

When we remember that over eleven million tons passed through the "Soo" canal this season, that over thirty million tons pass Detroit, and that the traffic of the Hudson River is estimated at eighteen and a half million tons, it will probably not be thought an extreme statement to say that a traffic of twenty million tons would be offered to such a canal if it had sufficient capacity to handle it and was free from tolls. Besides this a through cut from Lake Champlain would so add to the waters of the Hudson River as to be of great use to its navigation. As these locks are to pass masted vessels it will be necessary to have the gates of the full height of the combined draft and lift, but they probably will not strike the capitalists with such force as the cut from Lake Champlain, some fifty odd miles in length toward Troy, which has a 12-mile summit at Sandy Hill 150 feet above Lake Champlain.—*Ohio Valley Manufacturer*



ROCK DRILLS,
AIR COMPRESSORS,

STONE CHANNELERS,
HOISTING ENGINES.

COMPLETE PLANTS OF

Mining,
Tunneling,

MACHINERY,

Quarrying,
Contractors'.

—REPRESENTING—

THE INGERSOLL-SERGEANT DRILL CO.

THE A. S. CAMERON STEAM PUMP WORKS.

PULSOMETER STEAM PUMP CO.

MORAN FLEXIBLE STEAM JOINT CO.

100 to 104 W. Washington-st., - - CHICAGO, ILL.

BUCYRUS STEAM SHOVEL AND DREDGE CO.,

Bucyrus, Ohio,



MAKERS OF

Steam Shovels,

—FOR—

Stripping Coal and Ore, Railroads, Con-
tract Work, Brick-Yards, High-
ways, Etc., Etc.

—ALSO—

STEAM DREDGES.

In Your Correspondence with Advertisers
ALWAYS MENTION "STONE."

THE LARGEST IRON HORSE.

The new locomotive which now draws the Empire State Express on the New York Central, No. 903, is the most powerful locomotive engine in the world. It is two-fifths larger than the average railway locomotive. This immense "iron horse" weighs 100 tons, while the weight of the average engine is sixty tons, and it has 1,020 horse-power, while the ordinary locomotive has 800 to 900. It is believed by the company that the larger wheels of No. 903 will reduce the Empire State's time on the trip to Albany to two hours and fifteen minutes, from two hours and forty-five minutes, a saving of half an hour.—*The Inventive Age*.

A VISIT TO THE PLANET MARS.

The year 1892 has been exceptionally favorable for observing this neighboring planet. During fourteen years, since 1877, Mars has not so closely approached the inhabitants of the earth, and it will not return to the same position before the year 1909. At one of our leading observatories, for instance, not less than sixty eight drawings were made between the month of May and the end of October. Not only was the gradual melting of polar snows watched from day to day during the entire interesting period of their disappearance beneath the action of the sun, but all the geographical configurations were drawn—seas, continents, coasts, gulfs, straits, islands, lakes, mouths of rivers, canals, etc. It was, it must be confessed, a real pleasure, I had almost said a radiant joy full of emotion, to see each night this celestial globe turn before our eyes, borne onward by its rotary movement, and showing us successively the lands for which it is always mid-day, or on which the sun rises and sets; causing them to pass before us like

a panorama in twenty four hours also—truly a companion to the earth with oceans, sea coasts, immense plains, all the details of its surface visible; and, above all, an atmosphere pure and without clouds, for it is almost always clear with our neighbors in the sky.—*Camille Flammarion*.

A UNIQUE RAILWAY.

A curious little railway train goes crawling up and down the mountain from Tres Pinos to Bunt's lime kiln in the Gaviian range, San Benito Co., Cal., every day. It is probably the strangest railway that ever was seen, yet, thus far, very little has been printed regarding it. The train moves on a curious single track and is drawn by an engine set low on it. Both the engine wheels and those which support the cars have a single, pivot-like piece of steel that sits in the slot track, for it must be borne in mind that the track has a slot in it not unlike that seen in the cable track. In addition to that each wheel has a flange on each side of it, so that it cannot get off the track, no matter how abrupt the curves. The road, as completed, is now nine miles long, but when pushed through as intended it will be 14 miles in length. Three men operate it, a driver, a fireman and a brakeman. In one place there is an 800 feet gradient, mounted at the rate of 6 feet to the 100, yet the engine puffs right along with three or four loaded cars, not in the least bothered in any way. There is one gradient a quarter of a mile long, in which an average of 4 feet is gained to the 100. One curious thing about it is that the wheels are in a sense rollers. They reach from one side to the other. The flanges hold them on, assisted by the pivot, past which each half of the wheel comes down.—*Exchange*.

D. Y. JOHNSON, Pres't.

E. B. THORNTON, Sec'y.

THE BEDFORD STEAM STONE WORKS,

—Quarrymen and Wholesale Dealers in—

Buff and Blue Bedford Limestone,

ROUGH, DIMENSION AND SAWED.

Quarries in Dark Hollow, Ind. Mills and Yard at Bedford, Ind., on L., N. A. & C. and E. & R. Railways.

The only Stone Mill here having switches from Competing Railroads.

BEDFORD.

INDIANA.

Bedford Stone Quarries Company

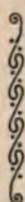
The Largest Dealers in Oolitic Limestone in the United States.

OFFICERS.

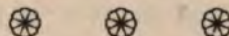
Chas. D. HAUK,
President.

W. C. WINSTANDLEY,
Secretary and Treasurer.

S. B. VORIS,
General Manager.



The Company actively operating a number of Buff and Blue Quarries; fully equipped with all modern machinery. Capacity practically unlimited. Mills and Quarries lighted with electricity enabling Company to run both day and night. Any sized order solicited. In addition to the Quarries operated, the Company owns about 1,000 acres of the finest Oolitic Limestone land, and is prepared to lease Quarry Sites to responsible parties.



For prices and further particulars, address

BEDFORD STONE QUARRIES COMPANY

Bedford, Ind.

TRADE MARK:
IMPERIAL BLUE OOLITIC
"DEEP ROCK."

H. L. THORNTON,
Pres't and Gen'l Manager.
E. B. THORNTON, Sec'y.

TRADE MARK:
IMPERIAL BUFF OOLITIC
"DEEP ROCK."

THE CHICAGO AND BEDFORD STONE CO.,

OWNERS AND OPERATORS OF

"BLUE HOLE" QUARRY AND MILL.

Sawed
Ashlar, Caps, Sills, Platforms, Etc.



Blue and Buff
Random and Dimension Mill Blocks,
Bases and Monumental Stone.

BEDFORD, INDIANA.

WONDERFUL CANAL SYSTEM OF FRANCE.

An official document shows that the length of navigable water-ways in France is some 8,000 miles, of which 650 are returned as tidal, 2,100 miles navigable without works, 2,250 miles canalized rivers, and 3,000 miles of canals, and of this vast network of interior navigation, the government has all but 7 per cent. in charge, the system having been brought to its present condition at a cost of \$300,000,000 for construction and purchase, and \$25,000,000 for concessions, with an annual cost, also, of \$325 per mile, average, for maintenance. The number of vessels employed on the water-ways is about 16,000, and of these 26 per cent. have a capacity of 300 tons or more, while more than half of them have a capacity exceeding 100 tons; the number of foreign boats also using the French canals yearly is said to exceed 2,000. The motive power is now almost entirely furnished by draught animals, though a few steam tugs are used on the Seine, the Oise and some other rivers, and steam cargo boats are occasionally met. Cable towing and tow locomotives are to a limited extent resorted to.

ANTI-RUST PREPARATION.

A good preparation for preventing tools from rusting is made by the slow melting together of six or eight parts of lard to one of resin, stirring till cool. This remains semi-fluid, ready for use, the resin preventing rancidity and supplying an air-tight film. Rubbed on a bright surface ever so thinly it protects and preserves the polish effectually, and it can be wiped off nearly clean, if ever desired, as from a knife blade; or it may be thinned with coal oil or benzine —
Power.

COMBUSTION WITHOUT SMOKE.

The Berlin correspondent of the London *Standard* tells "of a new invention which claims absolutely to do away with smoke from the combustion of coal. It has the great merit of simplicity. The coal is ground into powder and is injected into the boiler by means of a current of air, when it immediately becomes ignited from a small fire near the mouth. Other currents supply the air necessary for the combustion. The dust burns in one continuous intense flame, and not an atom escapes as smoke.

WHAT IS ELECTRICITY?

S. F. Walker, in an article in the London *Electrical Engineer* discussing the question, What is electricity? says: "As far as the writer is able to understand the matter now, electricity is simply the motion of the molecules of the different substances which are the subjects of electrical action, just as heat, light and sound are, and the only difference between the forces is the rate of the motion. The motion of sound, as we all know, is comparatively slow; that of heat and light is very rapid. That of electricity would appear to be somewhere between the slow motion of sound and the rapid motion of the heat waves, whose motion is slowest (that is, slower than that of light). And it would appear that the wonderful adaptability which electricity shows for every kind of work is due entirely to the position which its rate of motion occupies in the scale of the energies. It would also appear that the reason this wonderful agent lay dormant for so many ages, and is even now only partially developed, is very largely, at any rate, because we have no sense which responds to the particular periods of vibration comprised within the electric range."

B. C. & R. A. TILGHMAN,

1118 to 1126 South 11th-st. . . . PHILADELPHIA, PA.

Patent Chilled-Iron Globules, or



For Fast Sawing and Rubbing of Stone.

ORIGINAL AND STANDARD MATERIAL OF THIS KIND. WARRANTED SUPERIOR TO ALL IMITATIONS AND SUBSTITUTES
COSTS LESS, CUTS FASTER AND WEARS LONGER THAN ANYTHING ELSE. A COMPETITIVE
TRIAL WITH ANYTHING IN CUTTING STONE SOLICITED.

**SPEED, DURABILITY, ECONOMY, SAVING OF SAW BLADES, REDUCTION OF POWER, OVER
TEN YEARS' CONSTANT USE.**

Send for circular. See new prices for 1892.

Bedford Stone Quarries Company

The Largest Dealers in Oolitic Limestone in the United States.

OFFICERS.

Chas. D. HAUKE,
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W. C. WINSTANDLEY,
Secretary and Treasurer.

S. B. VORIS,
General Manager.

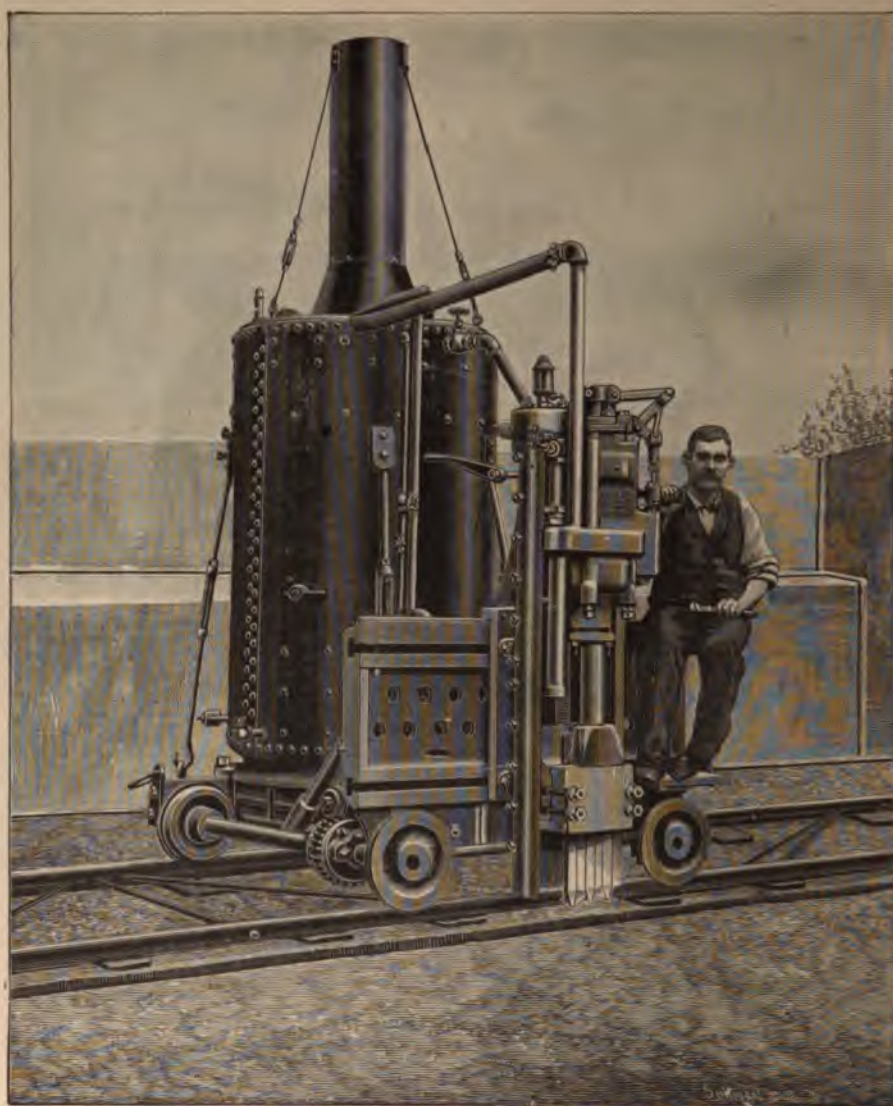
The Company actively operating a number of Buff and Blue Quarries, fully equipped with all modern machinery. Capacity practically unlimited. Mills and Quarries lighted with electricity enabling Company to run both day and night. Any sized order solicited. In addition to the Quarries operated, the Company owns about 1,000 acres of the finest Oolitic Limestone land, and is prepared to lease Quarry Sites to responsible parties.

For prices and further particulars, address

BEDFORD STONE QUARRIES COMPANY

Bedford, Ind.

(o)



The New Ingersoll-Sergeant Channeler,

Guaranteed to be without an equal in cutting capacity, durability, and economy of operation.

Used on a majority of the rock sections on Chicago drainage canal, and by the Bedford Stone Quarries Co., Bedford, Ind.; Romona Oolitic Stone Co., Indianapolis, Ind.; Oswegatchee Marble Co., Harrisville, N. Y.; Maxwell, Rolf & Co. (Sandstone), Cleveland, O.; L. B. McCabe & Brother, Texas, Md., and many others.

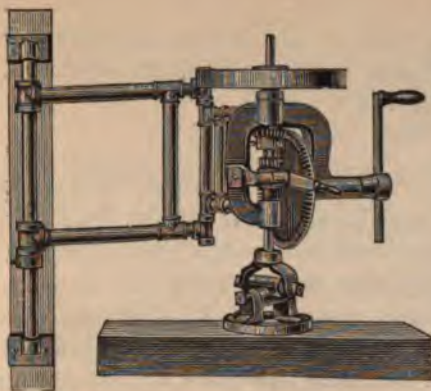
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Hawley's Patent Sand Feed

Is used by all the leading firms—saws faster and better than any other sand-feed. More gangs using our feed than any other. Easily kept in order. Over 50 gangs working satisfactorily, using either crushed steel or shot with our feed. Can give best of references.

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DEAR SIR:—I received the wheels, and find them as you recommended. We can do more with them in two hours than we could with the old style in ten, and am more than pleased.

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C. A. GATES.



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200 to 12000 Gallons per Hour.

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102 to 108 E. Second St., Cincinnati, O.

WHAT IS STEAM?

The above question is frequently asked of engineers nowadays, and, although they make constant use of steam, very few will answer that "steam is an invisible gaseous fluid, generated by the aid of heat, from water." Many of them, when told that steam is invisible, laugh and say they know better, because they see it every day. If one of these wise men who claim the honor and the name of practical engineers will take a look at the water-glass in the boiler-room, if they have one—if not, let them look at the one on their neighbor's boiler—and then tell if they can see any steam inside of it. If the glass should happen to burst while they are making the observation, they will, no doubt, see plenty of what they call steam in the vicinity, and they might also see the same if the safety valve should happen to blow off. Why then? Simply because steam is invisible, and so long as it is confined you cannot see it, but when it is cooled off, as when it comes in contact with the air, and is consequently condensed again to the water from which it originated, it becomes visible to the eye, like water in very small particles, as in a fog. Viewed at such times, it has lost its characteristics as steam, and instead of being gaseous fluid it has become condensed to water in very small particles, which occupy considerable space. When in this condition we see what we call steam, but when an engineer notes the flow of steam from gauge-cock or safety-valve, he will notice that near the opening nothing is visible, while at some distance he sees fog. The reason of this is that at all times steam is invisible while it remains steam, but by condensation and the formation of water a fog is produced, which can be seen and distinguished in no way from the fog which rises from rivers, swamps, or other bodies of water during

such times as the temperature and other conditions are favorable to its formation.
—*Machinery, London.*

A REMARKABLE CAVE.

A gentleman of Waycross, Ga., who has just returned from a trip to Decatur county, says that while he was there he was the guest of J. A. Connell, who owns vast acres of land. Mr. Connell went with him to a place on the estate where there is a remarkable waterfall and cave. The gentleman says: "Arriving near the falls one cannot but be impressed with the beautiful scenery; the trees and flowers trailing up the hillside. A stream of water which is fed by natural springs and augmented by the rain, ripples down the hillside for miles, and here the water jumps off and falls perpendicularly eighty-three feet over a ledge of rock into a natural basin which nature has formed at the foot of several high hills. After the water reaches the basin, it runs about ten feet and disappears abruptly in the earth underneath a ledge of rock. In the side of this rock there is an opening large enough for a man to crawl in. Taking a lantern we entered through the opening and found ourselves in a large cave. We went about seventy-five feet and found an underground river flowing gulfward. In the cave there is a faint light at midday. At a certain hour of the day, Mr. Connell says that if a newspaper is held at the opening of the cave it will be carried in by a current of air, and after a lapse of six hours the current drives the paper back again. Standing just below the cataract at midday, with a spray enveloping us, a rainbow as beautiful as any that has ever spanned the heavens was seen. This rainbow is a daily exhibition."—*Atlanta Constitution.*

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Buff and Blue Bedford Limestone,

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Powder, Dynamite, Rock Drills,
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Quarries and Mills at Rockwood, Ala.

Largest Plant and Best Facilities in the South.

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WELL-BUILT
SERVICEABLE

STEAM ENGINES!



12 TO 100 HORSE POWER.

Adapted to Heavy, Continuous Work.

EVERY ENGINE TESTED UNDER FULL LOAD.

Suitable **BOILERS** on hand for Immediate Delivery.

For Descriptive Circulars address

CHANDLER & TAYLOR CO., Indianapolis, Ind.

BULLET-PROOF UNIFORMS.

The invention of bullet-proof uniforms capable of resisting the projectile from a modern rifle has been a periodical theme for the sensational paragraphist of the daily press, but, like the Keely motor, the flying ship, and other wonderful productions, is not generally brought forth for public edification until "big gooseberries" are ripe. This year, however, it appears to have made its appearance somewhat early in the season, possibly owing to the exceptionally fine weather that has lately prevailed, and the columns of the daily press have been overrun with detailed accounts obtained by "our special interviewer" from the "original inventor" of the wonderful jacket that will henceforth enable the soldier to face a shower of rifle bullets with as much nonchalance as a shower of hail. The knights of old were wont, with a view to mitigate the ugly effects of a swashing blow from a broadsword or the sledge-hammer thwack of a mace, to load themselves with coats of mail that not infrequently rendered them as helpless as logs of wood when unhorsed. Armorers of old, however, had not the inventive faculty either of Herr Scarneo or the modern interviewer. These between them have, if we may believe the detailed account of a daily contemporary, succeeded in evolving what may in comparison be termed almost a light summer jacket, since it weighs only about one and one-half pounds, and is yet capable of turning aside a bullet from a modern rifle. With the scrupulous exactness characteristic of the modern interviewer, the exact diameter of the bullet as well as the range at which it was fired are given with the greatest nicety, though the charge of powder placed behind the missile appears, oddly enough, to have been overlooked. This, however, is a

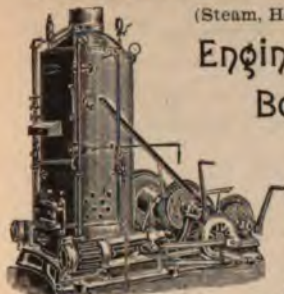
little detail that none but a captious critic would want to know anything about, while he also is the only one who would be inclined to view with sarcasm the fact that wooden dummies were used for the experiment in place of live men. We are afraid, however, that until the inventor of the bullet-proof jacket is prepared to present himself in a suit of his patent cloth for practical experiment, soldiers as well as engineers will be inclined to place bullet-proof jackets in the same category as electric belts and invisible paints.—*Practical Engineer, London.*

TO PREVENT JARS AND JOLTS.

By means of a simple arrangement, lately brought forward, it is found practicable to prevent the jolts and jars and vibrations common to vehicles that are driven over rough roads or upon street pavements when ordinary wheels of rigid construction are employed. Surrounding the outside of the periphery of the wheel, and in close contact with the tire, are a series of independent springs, which form the outer tread of the wheel; these springs are so arranged as to work in conjunction with each other, and, when moving under a heavy load, their free ends are sprung in toward the rim, coinciding with the true or working periphery of the wheel, the spring not coming in contact with the plane until the spring is nearly under the center of gravity. In this way the spring resistance is used in sustaining the load, and not in retarding the movement of the wheel—the springs, after passing the center of gravity, exerting a force against the plane over which they are passing to force the wheel ahead, thus making, as is claimed, a wheel that is not only easy riding, but easy propelling as well.

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(Steam, Horse and Hand Power.)



Engines,
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HOISTING ENGINES of any power or style, SINGLE AND DOUBLE CYLINDER, with improved patent friction drums especially adapted for all classes of work. Single and Double Drum, friction and direct geared, link motion Mining Engines. Four, six and eight spool, lock clutch, self-propelling BRIDGE ERECTING Engines.

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I HAVE IT.

A Rubber Spring for the Wardwell Channeler

That beats them all. Have captured the trade of this vicinity, and am getting any number of orders from a distance. MAY I HAVE YOURS? Springs sent on three months' guarantee.

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Of all Kinds. Does More Sawing, Uses Less Sand and Water, Requires Less Power and Repairs than any other. Runs only 20 revolutions per minute; Pays for itself in Six Months.

Cleveland, O., Oct. 1, 1889.

Messrs. Frenier & LeBlanc, Rutland, Vt.

Gentlemen: We are running 33 gangs with your sand feed, and see no reason to change our opinion as to the superiority of your machines. They will pay the entire expense of putting them in this season.

Yours truly, THE CLEVELAND STONE CO.

Write for Catalogue and Testimonials.

FRENIER & LeBLANC, Rutland, Vt.

WHAT A POUND OF COAL CAN DO.

"The day is not far off when we will get heat and power without the intervention and assistance of fire," said Civil Engineer Marston McGrath to a St. Louis *Globe-Democrat* reporter. "The solution will come when we get electricity direct from coal without the loss of any part of the wonderful energy that there is in fuel. I never knew fully the value of coal as a power producer until I saw it exemplified on a recent trip across the Atlantic in the steamer *Majestic*. The vessel carried 2,400 tons of coal—almost enough to give a half bushel to every family in St. Louis—and it used up 290 tons a day to maintain a speed of about twenty-three miles an hour. This seems like an awful lot of coal, doesn't it? But the *Majestic* is a big boat, 582 feet long and it requires an expenditure of 18,000 horse-power to drive it at top speed through the water. Figure the thing out, though, and you will see that one and one-half pounds of coal, which is less than a good handful, furnishes one horse power for one hour, and one-horse power represents the lifting to a height of one foot of 300 pounds, so that your one and a half pounds of coal lifts 300 pounds one foot, and sustains it for one hour. Or, take this illustration: It would require 100,000 galley slaves rowing night and day to carry the *Majestic* at a speed of twenty-three miles an hour. Dividing 18,000 horse-power into 100,000 galley slaves, we find that over one and one-half pounds of coal represents the work for one hour of about six rowers. Of course there wouldn't be room for the placing of more than 400 oars on the *Majestic*, and ten bushels of coal would do an equal amount of work, while the 100,000 galley slaves, if they averaged 150 pounds

each, would weigh five times as much as the 1,740 tons of coal required by the *Majestic* for a six days' trip."

STEAM CEMENT.

Many times little occurrences come up in an engineer's practice where some kind of cement which will stand the heat and pressure of steam can be used to excellent advantage. Perhaps a blow hole in the casting opens up and a stream of steam or water escapes. In such a case it would be most desirable if there was some cement handy which could be put upon the defective spot and would set within a few moments and afterwards remain tight. Many other circumstances often come up where a good cement that would set solid and strong would be found most useful. To be sure, one of the best ways of fixing such things when they occur is to replace the defective by new material, but as this cannot always be done without the expenditure of more time and trouble than is convenient to give it, something that will serve a good purpose instead is desired. A contemporary gives the following recipe for a preparation which, we think, will be found quite useful, as we have often used a cement of similar composition to this: Five pounds Paris white, five pounds red lead, four pounds black oxide of manganese. The whole is to be well mixed and a little asbestos and boiled oil added. This cement will set hard in from two to five hours, and it is not subject to expansion and contraction to such an extent as to cause leakage afterwards. Leaks that occur in places which are difficult to get at and remedy, may often be stopped by the application of a little cement composed of the above materials in about the proportions specified.—*Tradesman*.

ELECTRIC BLASTING



VICTOR ELECTRIC PLATINUM FUSES

Superior to all others for exploding any make of dynamite or blasting powder. Each fuse folded separately and packed in neat paper boxes of 50 each. All tested and warranted. Single and double strength, with any length of wires.

"PULL-UP" BLASTING MACHINE.

The strongest and most powerful machine ever made for Electric Blasting. No. 3 fires 30 holes. No. 4 fires 50 holes. No. 5 fires 100 holes. They are especially adapted for submarine blasting, large railway, quarrying and mining works.

VICTOR BLASTING MACHINE.

No. 1 fires 5 to 8 holes; weighs only 15 pounds, adapted for prospecting, stump blasting, well sinking, etc.

Standard Electric Fuse and Blast Tester, Wire Reels, new design, Leading and Connecting Wire.

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Celebrated Vermont Building Slate,
STEPS, PLATFORMS, URINALS, TUBS,
Cemetery Work, Vaults, Catacombs,
BILLIARDS, MANTEL STOCK. ESTIMATES GIVEN QUICKLY.



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Best Blocks Made.

Manilla and Wire Rope.

⚙️ Differential Pulleys of all Makes.

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VALUE OF TRADE-JOURNALS.

The trouble with a great many advertisers in trade-journals is that they expect too much. They expect the advertisement, to do more work than their best travelers, whose expenses are as much in one week as the yearly cost of the advertisement. As a rule, no attention by the advertiser is given to the advertisement except perhaps a change of wording once in six months. Speak to your customers through it the same as your traveler would talk to them, and you will soon discover that the trade-paper is the only medium. The publisher of the best journal in existence can only sell you space and guarantee circulation among your probable buyers. He cannot guarantee that the advertisement will pay you. That rests with yourself. You must use the space to your best advantage, and last, but not least, do not give your travelers all the credit for the year's business. Another mistake is that advertisers look too much for cheap advertising. When you are sick do you look around for the cheapest doctor? Or, if you want to engage a lawyer, do you look for the low-priced and most obscure? Certainly not. The best evidence of the value of a paper as an advertising medium is its ability to secure and hold the best-paying class of advertisements. — *Mining and Scientific Press*.

LOSS OF WEIGHT OF GOLD COIN BY ABRASION.

The loss in weight of gold coins by abrasion has been often referred to but without any definite statements as to the amount of loss thereby occasioned. An instance was recently related by a banker knowing, of the incident which

conveys actual information on the subject. He said: The loss which gold coin suffers in circulation was recently illustrated in the case of a firm sending \$15,000 in gold coin to pay duties on imports. The amount was counted and sent over to the sub-treasury. A little while after the sub-treasurer sent it back with notice that the amount was \$1935 short. On investigation it was found that while the face value of the coin was \$15,000, by weight the gold lacked nearly \$2,000 of that value. The paying bank was notified and sent a gold certificate for the balance.

ALUMINUM HORSESHOES.

Aluminum horseshoes are said to have been tried with remarkably successful results in the Russian army. According to a note translated by Captain E. Lambert from the *Invalide Russe*, a few horses in the Finland Dragoons were first chosen and shod with one aluminum shoe and three iron shoes each, the former being on the fore foot in some cases and on the hind in others. The experiments lasted six weeks, and showed that the aluminum shoes lasted longer and preserved the foot better than the iron ones. No aluminum shoes broke, and they were used over again for re-shoeing. The horses, moreover, were worked over hard and very stony ground. The most important fact of all is that aluminum horseshoes are only one-third to one-fourth the weight of iron shoes. Their cost is admittedly greater; but, on the other hand, very little charcoal is required in shoeing, there is no loss in weight, and the value of the old metal is the same as that of the fresh.

WASHBURN & MOEN MANUFACTURING CO.,

WORCESTER, MASS.

NEW YORK CITY.

CHICAGO.

Makers of Iron and Steel Wire for all Purposes.

Manufacturers of Wire Rope and Cable

ESTABLISHED,

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ESTABLISHED,

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IRON, STEEL AND GALVANIZED, FOR HOISTING AND GUYS.

Fittings of All Kinds Attached to Ropes when Desired. Prompt Shipments from Stock.
Chicago Office and Warehouse.

107 & 109 LAKE STREET.

SOME QUARRYMEN USE POWDER

AND FIND IT PAYS.

OTHERS would use it, but are afraid it will damage the Rock. It won't, if you know how. Hundreds have earned that it is the Safest, Speediest, Most Economical Way to Quarry



DIMENSION

∴ STONE ∴

Write to

*Knox
Can
Show
You
How.*

THE KNOX ROCK BLASTING COMPANY,
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HERCULES

POWDER

STRONGEST AND SAFEST DYNAMITE EXPLOSIVE
KNOWN TO THE ARTS for all Mining, Railroad
Work, Rock and Stump Blasting.

FUSE, CAPS, BATTERIES AND ELECTRIC MINING GOODS.
Hercules Powder Co., 40 Prospect St., Cleveland, O.
J. W. WILLARD, Gen'l Manager.

Indianapolis Office, 81 West Washington Street.

XX

BELGIAN BLOCK BEST.

During a discussion in the Philadelphia Common Council on the respective merits of granite and asphalt as a pavement, some of the members declared that the asphalt was totally unfit for paving purposes; that during the past winter so many horses were disabled by falling on the slippery and almost impassable surface of these pavements on Broad and Diamond streets that the losses entailed thereby were growing to be a serious question. Also, that in summer asphalt pavement throws off a great deal of heat, and, as one of the chief merits asphalt was held to possess over other pavements was its advantages in the line of sanitation, this throwing off heat hardly bears that out. The Belgian block pavement was conceded to possess all the qualities that go to make up a desirable and practicable pavement when properly laid. There is no doubt but that granite block pavement is the only serviceable pavement on streets where there is much traffic and where there is the proper attention paid to the making of the blocks and the laying of them. It makes a street that is smooth enough for all practical purposes.—*Paving Cutters' Journal*.

TALC MANUFACTURE.

The manufacture of talc in the vicinity of Gouverneur, N. Y., is assuming vast proportions. The daily output is now nearly 200 tons. G. B. Planck, who is in charge of the mill work at the Adirondack mill, gives the following brief account of its manufacture:

"The talc as it is dug up out of the earth is run through two sets of immense crushers which reduce it fine enough for the buhr mill stones, of which there are several sets. The burrs resemble the old mill stones which formerly were used in the grinding of flour. The talc is by this process reduced to powder, but this is not sufficiently fine

for the purpose for which the talc is intended. It is next placed in sheet-iron cylinders with nearly the same bulk of Scotch pebbles, and submitted to a further reduction by rapid revolutions of the mass. The cylinders are in most cases six feet in diameter and seven feet in length.

The talc is four hours in going through this process, and is then bolted like flour and placed in fifty-pound sacks. Some of the product which is not capable of as great reduction is packed in sacks holding 160 pounds and shipped to Europe.

The manufactured product is used in making wood filling and paper sizing. It is claimed that much of the product is used in the adulteration of paint, candy and foods. It is sold for about \$10 per ton.

RIGHT OF WAY FOR QUARRYMEN.

A bill has been introduced in the Ohio legislature, giving mining, quarrying and manufacturing companies constructing railroads or sidetracks all the powers and privileges granted by law to railroad corporations. In southern Ohio there are a large number of quarrying companies operating at a short distance from the Ohio River, and from railroads, and in order to market their stone have to build a railroad track. Under the present law, if a property owner objects to a track being laid on his land there is no recourse. The new law gives such companies right to condemn property for tracks the same as a railroad company. This bill will settle a long and bitterly fought contest in which W. R. Smith & Sons, of Otway, were involved, and establishes a precedent which is likely to benefit quarrymen in different sections of the state, whose property is located distant from main lines of railway. Such a law would be of great value in Indiana, and in fact in most states.—*Portsmouth Press*.



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AIR COMPRESSORS,

STONE CHANNELERS.
HOISTING ENGINES.

COMPLETE PLANTS OF

Mining,
Tunneling,

MACHINERY,

Quarrying,
Contractors'.

—REPRESENTING—

THE INGERSOLL-SERGEANT DRILL CO.

THE A. S. CAMERON STEAM PUMP WORKS.

PULSOMETER STEAM PUMP CO

MORAN FLEXIBLE STEAM JOINT CO.

100 to 104 W. Washington-st., - - CHICAGO, ILL.

BUCYRUS STEAM SHOVEL AND DREDGE CO.

Bucyrus, Ohio,



MAKERS OF

Steam Shovels,

—FOR—

Stripping Coal and Ore, Railroads, Con-
tract Work, Brick-Yards, High-
ways, Etc., Etc.

—ALSO—

STEAM DREDGES.

In Your Correspondence with Advertisers
ALWAYS MENTION "STONE."

FAST RAILROAD TIME.

Exceedingly fast time has been made on some American railroads within the past few years, in several instances a speed of more than a mile a minute having been attained. But in nearly all these cases the runs have been short, often covering only a few miles. For a trip of nearly two hundred miles, the record made a short time since on the Chicago & Alton road between Chicago and Springfield, has rarely been equaled—never, it is said, on a western road, whether for a long or short run. The distance traveled in this case was 186 miles, which was accomplished in 196 minutes, making fourteen stops and eight slow-ups. The train consisted of seven cars, and was drawn by an eight-wheel engine, the weight of which is stated at 93,000 pounds.—*Exchange*.

FORMS OF SNOW CRYSTALS.

The pure white luster of snow is due to the fact that all the elementary colors of light are blended together in the radiance that is thrown off from the surface of the various crystals. More than a thousand distinct and perfect forms of snow crystals have been enumerated and figured by the various investigators in that line. One hundred and fifty-one different forms were once observed by the English Scientist Glashier, who carefully made engravings of each and printed them in a paper attached to the report of the British Meteorological Society for the year 1855.—*St. Louis Republic*.

CHINESE LABORERS.

The wages paid to laborers are about twelve cents per diem, with rations. The workers are easily contented, demanding only the plainest of food, while for housing they are satisfied in winter to creep all together under a long low mat shed with a solid back to the north

wind. The severity of the weather, however, usually stops all such work before Christmas. What the men do when they retire to winter quarters I cannot tell; but Chinamen have a curious hibernating faculty, whereby by abstaining from muscular exertion they are able to economize considerably in their eating. In times of scarcity, when wages fall below a certain range, poor people sometimes choose not to work, because they consider that they would have to take more food to repair the waste than the work done would produce.—*Mackmillan's Magazine*.

FOREIGN AND DOMESTIC CREDITS.

After reviewing at some length the present and prospective disturbance of American finances by the great and apparently growing demand for gold in Europe, Henry Clews remarks: "Our exposure to this sort of thing is no more than might be expected from our large dependence upon European credit; but it surely should be a serious question with Americans whether this sort of subjection is any longer a necessity, at least to such an extent as it now exists; and whether, with our vast increase of wealth, the time has not come when New York should have credit institutions competent to relieve this country from foreign relations that expose us to all the political and financial dangers of conditions in which we have no direct interest. The immediate policy of this country should be, less money for speculative enterprise and more for broadening and consolidating our own credit organizations." There are those who have given careful, intelligent consideration to this subject who think this country should prepare to dispense with the use of all private credit organizations and use that of the whole people in the organized capacity as the medium through which to effect the exchanges.

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HOISTING ROPE.

The Secretary of Mines of Victoria embodied in his report for 1890 an article on mine ropes, which has been quoted in a number of American journals. As many of the statements therein differ from the usual practice in this country, the following extracts and comments on the subject of hoisting rope have been prepared.

According to the report all rope should be guaranteed by the makers, and it is said that in Belgium the guarantee for sisal rope is that it shall last $1\frac{1}{2}$ to $2\frac{1}{2}$ years, and 1-12 or 1-24 of the value may be deducted for every month short of the stipulated duration.

In view of the varied uses to which an American contractor will put the same piece of rope it would seem that except in special cases such a guarantee would be impracticable. The life of a wire rope in particular depends upon the method and manner in which it is used. Five months in some places might be as good service as five years in others.

Iron wire for rope should be strong, hard and not galvanized, according to the writer of this paper. Steel wire should be made from crucible cast steel of very homogeneous and comparatively hard quality, and suitably annealed. It should be tested by tensile strength, stretching, bending and torsion. Torsion is considered an excellent test for homogeneous quality in wire. Steel wire of 0.059 and 0.118 inch diameter should, it is said, stand twisting through 40 and 20 revolutions respectively in an unloaded length of six inches, and the surface markings produced by the twistings should follow regular lines.

The remarks in the above paragraph, while, in the main, corresponding to the American views are somewhat ambiguous. Wire for hoisting rope should be tough and strong. The writer uses the

term "hard," which is hardly proper, since strength and toughness are the qualities desired. The word "anneal" is probably used in the sense of "temper."

The following paragraph, somewhat condensed from the original report, requires special attention:

"The size of the wires and length of lay and pitch in the rope should vary in accordance with the diameter of the drums and pulleys around which the rope will have to work. Large diameters for drums and pulleys are said to be of more importance for wire ropes than for hemp, and for steel than for iron. The smallest diameter should be at least 1,300 to 1,400 times that of the iron wire in the rope and 2,000 times that of the steel wire. It is well for the smallest diameter of pulley or drum to be not less than 80 to 100 times the diameter of a wire rope, or 50 times that of a hemp rope."

In designing a rope the first thing to be considered is the load, which determines its size, and having the size determined, the diameters of the drums and sheaves can then be fixed. While it is very desirable, as far as the life of a rope is concerned, that the largest possible sheaves and drums should be used, yet American practice permits the use of much smaller sizes than above indicated. Following that rule, we would require 13-foot drums for a 1-inch regular steel hoisting rope and a 16-foot drum for a patent steel rope of the same size. American rules call for drums of 4 and 5 feet diameter, respectively, the proportions being 600 times the diameter of the wire for steel and 450 times for iron, while, we are informed, an extra flexible special steel rope has been successfully used on sheaves only 200 times the diameter of the outside wires.

American practice allows for a factor of safety of from 6 to 8, but the report states that large ropes should not work

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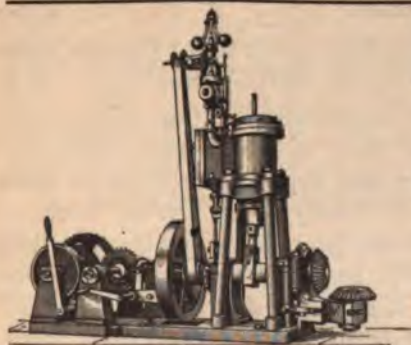
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The report very truly insists that careful maintenance is indispensable to the preservation of all rope, especially those of wire. Hemp rope needs tallowing regularly and sisal rope should be kept continually damp, according to this report. Wire rope, particularly of steel, should be greased regularly to prevent rust. The grease, the writer says, should be soft enough to work between the strands, but stiff enough to stick on the outside of the rope. A mixture of oil and grease, well stirred and laid on hot with a brush is recommended.

In America the practice is to use vegetable oils rather than animal grease. Where the rope is to be exposed, it is not unusual to paint it when manufactured, and afterward, while in use, to apply a covering of linseed oil and pine tar. The Washburn & Moen Company advise the occasional use of a coating of linseed oil or paint formed of equal parts of linseed oil and Spanish brown or lamp-black. If used under water or under ground, they state that the best preservative is made by adding to one barrel of tar one bushel of fresh slaked lime. This is boiled well and applied hot. Sawdust or oatmeal is sometimes added with good effect, it is said.

Wire ropes wear out from two causes, repeated bending of the wires and abrasion. Both these causes must be considered in fixing the fineness of the rope for any given purpose. For ordinary work, hemp cores, or centres, have proved to be desirable. They stretch with the strands, allowing the wires to imbed themselves solidly and give greater flexibility than could be obtained with wire centers. Wire rope must not be coiled or uncoiled like hemp rope, but should be kept on a drum. It is always advisable to line the grooves of a cast-iron pulley with wood, set on end, leather or rubber.

A WRINKLE IN BABBITTING.

A little wrinkle in babbitting journal boxes is given by a Canadian writer which, although not new, may not be generally known. When lining up a shaft put a small piece of pine wood in the bottom of the box, in length about one and one-half or two inches less than that of the box, and in width five-eighths to one and one-half inches, according to the size of the box. Equalize it in the bottom from each end and let the shaft lie on it and pour. After you have scraped out the box remove the piece of pine and substitute some woolen cloth saturated with oil. This prevents the oil from dripping off, and not only insures a positive lubrication of the journal, but also is clean and requires less oil than other journals.

IRON FROM SAND.

An immense iron plant, says the *Tacoma News*, is in preparation at Tacoma for making iron by a new process and new material. A superior metal is to be made out of sand, and the same paper says that the iron thus made is superior to any made elsewhere on the coast. It is done by the use of a patent smelter. By a combination of chemicals and electricity the new superior iron is made out of common beach sand. The discovery, if truly represented, will cut an important figure in future iron making on the coast and will cheapen it very materially.

HOW TO ABBREVIATE WASHINGTON.

Wn. is getting to be the abbreviation for the State of Washington. We cannot see any objection to it as we have Pa. for Pennsylvania, Vt. for Vermont and so on through all the states. It is certainly much handier than Wash., and there is no likelihood of its being confounded with that of any other state. Wn., we believe will be a go.—*Ellensburg Localizer*.

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EXPLAINING A NATURAL WONDER.

The presence of fish in the higher mountain lakes has been explained in some cases. It is well known that water fowls will distribute yellow perch by carrying the sticky eggs on their feet. Trout will go anywhere there is water enough to float a chip, and pickerel get moved about from place to place the same as perch do, but bass do not become distributed except through man's handiwork, or by going up a water course deep enough to swim.—*Pittsburgh Dispatch*.

CARRYING CAPACITY OF WIRES.

The safe carrying capacity of a wire is that current which it will convey without becoming painfully warm when grasped in the closed hand. In reference to this it must be remembered, says the *Electric Age*, that this test cannot be safely made with the wires carrying currents for arc lights, and it is intended to be applied only with reference to the conductors of incandescent lights. These may be handled without risk; but with the conductors of the arc lights, where, as is usually the case, there are a number in series, a severe shock may be experienced on touching the wire, and if a ground connection existed by chance elsewhere, and some other conditions were present by which the full force of the current passed through the body, this shock might be fatal.

TIMBER FOUR THOUSAND YEARS OLD.

Probably the oldest timber in the world which has been subjected to the use of man is found in the ancient temple of Egypt, in connection with stone work, which is known to be at least 4,000 years old. This was the only wood used in the construction of the temple, and it is

in the form of ties, holding the end of one stone to another. When two blocks are laid in place, an excavation about an inch deep was made in each block, in which one of these wooden ties, shaped like an hour-glass, was driven. It is, therefore, very difficult to force a stone from its position. These ancient ties are made of timarisk or Shittim wood, the same as that from which the ark was constructed.—*St. Louis Republic*

LINK BELTING.

As mill owners find it a great advantage to have link belting to operate certain lines of their machinery, an account of it will be interesting, says the *Commercial Bulletin*. Before writing this article we called at several factories where the belting had been introduced for the purpose of getting real facts. The result of our investigations demonstrated that these belts are valuable for many purposes. They are better for damp places than rubber. They are absolutely waterproof because there are no cemented joints to give away. The small links used in the construction of these belts are made of the very best of leather, and not from any kind of waste ends as some suppose. They are made with special coupling joints so that they can be readily put together.

THE GRANITE MOUNTAIN AT LLANO, TEXAS.

It is reported that the granite mountain in Burnet county, near Llano, Texas, has been sold to C. P. Huntington, of the Southern Pacific Railroad Co., for \$300,000 cash. This mountain is now furnishing the granite for the Galveston harbor jetty work, and from this quarry, we believe, at least from the same locality, was taken the granite used in the building of the magnificent capitol at Austin, which cost over

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\$3,000,000. The Llano people have had a great deal to say about their Bessemer ores, but comparatively little attention has been given to the granites and marbles of Llano, Burnet and Mason counties, which are found in inexhaustible quantity and of many varieties. One variety, known locally as "opal granite," is a dark mottled color, showing when polished on almost every spot of its surface as large as a ten-cent piece a beautiful opal. About twenty miles from Llano there is said to be one solid mass of granite covering 600 acres of ground, rising almost perpendicular on three sides to an elevation of 300 feet, the fourth sloping sufficient to make it possible to climb to the top. When on top of this great granite pile you find an unbroken surface of solid granite covering nearly 150 acres, and looking down over the three perpendicular sides you see the ground just 300 feet below you. It is said that there is only a small crack in this entire mass of granite.—*Manufacturers Gazette*.

NEW YORK TO PHILADELPHIA IN HALF AN HOUR.

If the expectations of a Cleveland inventor are realized the mode of travel and transportation may be changed in the near future. A. Gates has designed an elevated railroad to run from Philadelphia to New York, to be built and controlled by eastern capitalists. The model represents a car suspended from an overhead track and propelled by electricity. It hangs twenty feet above the earth. The journey from New York to Philadelphia, it is claimed, can be made in a little more than half an hour by this swinging, hurrying electric bird. Mr. Gates has had his electric car patented, and it is expected to build this eastern line, and send the first train over the mid-air track within the year.—*N. Y. Commercial Advertiser*.

DIRECTIONS FOR USE OF MACHINERY.

Speaking of "directions for use" leads to a thought or two upon a fault in the catalogues and descriptive circulars issued by manufacturers containing such directions. This fault is a too frequent omission to state reasons for using or doing things which do not obviously show a reason for their use. The mechanical mind is always a reasoning mind, made so by the every-day demand upon it for finding out causes for defects and supplying remedies for them. It insults the reason of such men to demand arbitrarily, as a condition of success, that some material out of ordinary use for analogous purposes, or some mode of proceeding out of the common in the management of machines or appliances, must be used or followed, without also stating why such material or method is essential. Without this any self-respecting man is apt (such is human nature, to say: "If this material or method be only a matter of mechanical judgment, I see not why I should trust the judgment of another any more than my own;" and he will, not unnaturally, be likely to take his own course regardless of directions. If, by this action, the machine or appliance comes to grief, and the manufacturer of the article throws the onus of the failure upon the user, the latter may, with some justice, retort that, if his common sense had been appealed to in the first instance by some rational explanation of requirements, he would have better appreciated their importance and not looked upon them as perhaps the cranky notions of a visionary inventor. It is to the interest of every manufacturer of any material, machine, or appliance used in the mechanic arts that what he makes shall give satisfaction in use.—*Engineering Magazine*.

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